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Vol. 43, No. 10

OCTOBER, 1946

\$3 a Year, 25 Cents a Copy

Covering the Field

• Dam Construction

The plant set-up and handling of concrete at Bluestone Dam is described on page 1, and pictured on pages 40 and 41.

• Bituminous Paving

Removal of a $\frac{1}{2}$ -mile death trap on a heavily traveled route involved the elimination of a sharp curve and sudden pavement narrowing before replacing the old pavement with bituminous macadam. See page 1.

• Road Maintenance

How equipment and snow-fighting methods prevail against mountain-pass snowfalls of 30 feet in an average year is told on page 1.

Page 50 covers a low-budget fight in a sparsely populated state against tourist wear and tear on roads.

• Concrete Culvert

Pictures on page 2 trace the steps in constructing a double-box concrete culvert to enclose a creek at an airport.

• Highway Widening

Page 6 details the addition of a 4-foot concrete widening strip along 7 miles of U. S. 13, as well as the patching and resurfacing of the old pavement.

• Channel Dredged

Hemlock stumps were one of the problems of dredging the Willapa River channel in Washington. Page 10 tells how the hydraulic dredge was adapted both to the job and the 57-mile voyage to it.

• County Road Work

Soil problems and low-type road surfaces dictate a policy of improving old roads before building new, says one county engineer. See page 17.

• Bridge Construction

The contract for a 402-foot 3-span steel bridge supported on concrete abutments and piers is described on page 23.

• New Airport Built

A 7,300-foot runway and two taxiways surfaced with hot-mix were recently completed at a new airport in the Nevada desert. See page 28.

• Safety in Blasting

An important phase of accident prevention is care in the use of explosives. For some do's and don'ts in handling and storing explosives, see page 33.

• Rock Jetties

Cranes working from temporary wooden trestles placed 38,000 tons of heavy stone for three jetties to check beach erosion on Long Island. See page 37.

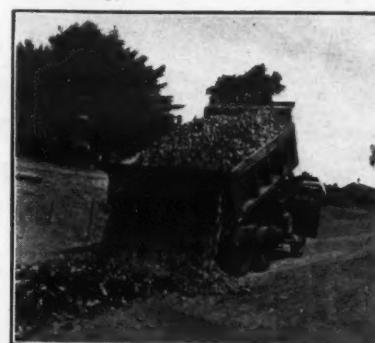
• Highway Grading

A 0.6-mile relocation to eliminate a sharp reverse bend involved 49,000 yards of excavation, as reported on page 47.

On an 18.35-mile road-improvement job, realignment of 1.6 miles entailed over 100,000 yards of rock removal in a single mountain cut. See page 57.

(You will find "In This Issue" on page 4)

Contractors and Engineers Monthly



C. & E. M. Photo

A Ford truck dumps a 10-ton load of crushed stone for the base course on a recently improved section of U. S. 1 in southwest Maine.

Hazard Removed By New Alignment

Transition Lengthened; Curve Lessened on $\frac{1}{2}$ -Mile Section of Maine's U. S. 1; Macadam Surfacing

♦ NO longer will a treacherous section of U. S. 1 in the southwest corner of Maine, between York Corner and Cape Neddick in York County, hold the unenviable distinction of being a death trap. The reconstruction this year of a $\frac{1}{2}$ -mile stretch of highway where six persons last year met their end in automobile accidents has removed this death trap. The reason for the fatalities is not hard to see. Cars traveling at high speed around a sharp curve on a four-lane highway were suddenly confronted with the abrupt narrowing of the road to three lanes. The elimination of this hazardous condition got under way in May when the Maine State Highway Commission awarded a contract for the $\frac{1}{2}$ -mile improvement to the Bridge Construction Corp. of Augusta, Maine, on its low bid of \$49,456.

(Continued on page 21, Col. 4)

Snow, 588 Inches of It, Is Plowed in Peak Year

Transcontinental Routes In High Sierras Pose Nation's Most Serious Snow-Removal Problems

♦ ONE of the worst snow-removal jobs in these United States is in the strategic Donner Pass of the high Sierras, where some 588 inches of snow have been known to fall in a season. They have had temperatures down to 25 degrees below zero there, and packed snow $17\frac{1}{2}$ feet deep. The year of 1945-46, which was only an ordinary one so far as snowfall was concerned, saw a mere 30 feet of snow!

Donner Pass is in California. This bad snow-removal problem is in Cali-

Dam Will Control Run-Off From a 4,565-Mile Area

By HOWARD V. PEHRSON,
Field Editor

(Photos on pages 40 and 41)

Work Nearing Completion in First Cofferdam Section Of \$12,000,000 Bluestone Reservoir Project

the dam site delayed the call for bids until after the damaging flood of 1940. Finally, in 1941, Army Engineers received bids for construction of a 2,060-foot-long dam on the New River $2\frac{1}{2}$ miles south of Hinton in Summers County, W. Va.

The Dravo Corp. of Pittsburgh, bidding \$11,376,080, was awarded the contract and on January 19, 1942, work was started on Bluestone Dam. A little more than two years later, on March 1, 1944, with construction approximately 38 per cent completed, the project was halted because it was not considered essential to the war. Almost two more years passed. Then, on January 2, 1946, Army Engineers ordered work resumed on the partially completed structure. Since that time, work has progressed at full speed; by midsummer, construction in the first cofferdam area was nearing completion.

Description of Dam

The Bluestone Dam on the New River will have a length of about 2,060 feet and will rise from below the river bed for about 185 feet to the top of the non-overflow section. At the spillway section, the dam will be a solid wall of concrete 140 feet wide at the foundation and 38.5 feet wide at the top. The spillway section includes 21 crest gates, each 30 feet wide x 31 feet high. The spillway itself is 790 feet wide.

The dam is comprised of an east abutment section 215 feet in length; a non-overflow section 268 feet long; an intake section 330 feet long; an assembly bay

(Continued on page 72)



California Division of Highways Photo
This scene in California's Sierras dramatizes the depth of drifts and job facing the snow-removal crew responsible for keeping this main route clear.

(Continued on page 15)

Creek Enclosed on Airport Project



The enclosure of Clear Creek was included in the improvement to provide for modern air traffic at Lambert Field, near St. Louis, Mo. This was done by constructing a double box culvert, a portion of which will carry the new runways. The twin boxes of the culvert are 15 feet wide x 10 feet 4 inches high, and have a common center wall 1 foot 3 inches thick. The inside walls have a slight curve and, at the thinnest cross section of the roof and bottom, are 1 foot 10 inches thick. The sides are 1 foot 9 inches. Where no runway support is needed, these dimensions are 6 inches less, except for the center wall.

How Fred Weber Jr. of St. Louis handled this contract is told in these pictures by Blaine Britton.

1. This general view of the Fred Weber contract shows the bed of Clear Creek at the left, and the advancing culvert construction. The Lorain dragline on the bank is excavating and shaping the cut. The belt conveyor on the left bank was swung from another of the three Lorains on the job to place concrete in the forms. In the background are the airport buildings; they look deceptively close.

2. Forms are prepared for pouring the invert, 60 feet of which was poured at a time. Crushed stone was used as base, providing excellent drainage.

3. Blaw-Knox forms were used for the culvert barrel, placed inside by the carriages in the lower right. These were run in on rails and the forms put in position by hydraulic jacks. The Lorain crane, bearing its warning flag at the tip of the boom, is holding a form in position. The culvert is in the shape of an S across the field, curving to the right towards the low bushes in the background, and then swerving to the left again to leave the field near the road visible under the crane boom.

4. This view of the culvert barrel shows a form being bolted in place; also the reinforcing steel. Weber poured 90 feet of barrel at one time; two pours a week. Frequently 540 yards of concrete was placed per day.

5. Here the completed culvert is being covered with earth by a Caterpillar D8 tractor-dozer. When the improvement to Lambert Field is completed, one runway will cross the culvert at about this point.



Across the country, road builders choose Texaco for Asphalt projects of every type



MISSOURI
Laying a 2-inch Texaco Asphaltic Concrete pavement of the hot-mixed, hot-laid type on a chat base in Joplin. Contractor: Independent Gravel Company.



RHODE ISLAND
Constructing a Texaco Sheet Asphalt pavement (1½-inch binder course and 1-inch wearing surface) over an old worn street in Pawtucket. Contractor: Campanella and Cardi, Providence.



COLORADO
Spreading mix by power grader in the construction of a low-cost Texaco Asphalt surface of the plant-mixed type in Fort Morgan.



INDIANA
Applying Texaco Slow-curing Asphaltic Oil for a low-cost Texaco surface of the mixed-in-place type in Huntington County. Contractor: Laurence Gray, Wabash.

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Scrap for Peace

The wars have ended but the shortages linger on. Nowhere are they felt more seriously than in the construction industry, where new equipment and materials are still scarce and difficult to obtain. Chief among the basic shortages, of course, is steel—that hard, white metal needed both for the manufacture of construction machinery and for almost every type of construction. But there is nothing we can do about it, the construction industry may lament, except wait idly for more steel to be produced. Fortunately there is something we can do.

A major cause of the retarded production of steel is the drastic shortage of steel scrap. Scrap normally makes up 50 per cent of the charge in open-hearth furnaces whence comes the greatest proportion of steel. In recent weeks the scrap supply has been so meager that twenty-five to thirty open hearths have been unable to operate. If the flow of scrap remains low, more furnaces will have to bank their fires. Many factors contribute to this dearth of scrap. Old automobiles are on the roads instead of on the junk piles. Obsolete farm machinery, locomotives, railroad cars, even rails, etc., which

long since should have been converted into scrap and replaced with new stock, are still in service. Chaotic conditions abroad have held up the return of battlefield scrap. Strikes in consuming and fabricating industries have also helped to cut the supply.

From 1942 to 1945 everyone pitched in to collect scrap for the greedy maw of the war machine. Scrap drives then came up with the tons of material needed to make the bullets and bayonets, the bombs, tanks, ships, and planes that meant the margin of victory. We need the same type of scrap now to produce tractors, graders, shovels, etc., along with reinforcing and structural steel. And we need the same type of scrap drives.

Many a repair shop and yard belonging to a contractor, as well as the property of many state or county highway departments, could be cleaned up by getting rid of a lot of old equipment, parts, or materials which are still lying around though they have not been used in years. By moving this industrial scrap to market, the construction industry can really help itself; it can charge the furnaces which will turn out the steel it is now finding so hard to get.

Economy in Flood Control

The recent retrenchment by the Office of War Mobilization and Reconstruction in the construction programs of various Federal agencies will be felt particularly by the Army Engineers who are responsible for protecting the Mississippi Valley from floods. Several flood-control projects which had been deferred by the war and were now almost in the contract-letting stage have been suddenly postponed. This curtailment of the public-works program in the interests of economy is a serious step, inasmuch as civil works were practically at a standstill during the war years when money for military construction was spent so lavishly.

In the Mississippi Valley the lives and property of many are protected by dikes and levees which keep the Father of Waters and his tributaries from breaking out of bounds and sweeping across country to leave death and destruction in their wake. Too often has this happened and now, just when the Army Engineers were about to see their plans for adequate flood-control projects realized, they find that many of them must be postponed. High waters and floods cannot be postponed, however. If the floods of 1943 and 1944 are repeated in the Valley, the loss to individuals and to the country as a whole will not be atoned by any temporary savings effected in holding up this greatly needed protection. When lives and security are involved, econ-

omy in public works may well prove too costly.

Private Enterprise And Building Roads

With memories of WPA wastefulness and incompetence lingering in the public mind, the American Road Builders' Association points out that it should be unnecessary to emphasize the advantages of the contract system over the force-account system in highway construction. But with the nation entering the greatest road-building program of all time (at least we have the plans and the money for it), it might be well to review why force-account or the man-with-the-shovel system should be avoided. This is especially true in the matter of secondary or farm-to-market roads.

On the main highways, the operation requires the equipment and know-how of an accredited highway contractor. But on country roads, there exists in some localities, ARBA states, the inclination to round up a road gang, collect what equipment is available, and start on a catch-as-catch-can basis. Before trying it, this method should be compared with the higher efficiency, longer-lasting results, and lower costs of the contract system, under which a contractor who has studied the project is willing to stake his money and his reputation on completion at a certain time, to specified standards, and for a specified price. One of the tenets of the American Road Builders' is that private enterprise, which involves competitive bidding, is fundamental to the American way of life.

It is sometimes stated that on lesser roads the job is not big enough to justify a contractor's bidding. This is debatable. Many leading highway contractors are adapting their equipment and developing new techniques for putting down all-weather roads at the lowest possible cost per mile. Then too, by grouping a number of small jobs into one contract, it is possible for a contractor to adjust his men and machines to the requirements of the project.

These are practical solutions. They prohibit favoritism, politics, delays, and the other ills found under the force-account plan. They protect the taxpayer's money and give him a road that will stand up under traffic.

Are You Kidding Yourself?

A thought that every citizen of this country should carry always with him was expressed succinctly by the magazine *Indiana Petroleum Industries*.



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"When the word 'taxpayers' is substituted for 'government', a great many people will realize for the first time that all the money which is being spent and distributed by the various units of government is coming from the taxpayers themselves.

"No unit of government, whether township or federal, has one cent of money. The money to run the township, county, state, and federal units of government comes from the taxpayers. There is no other source. There is nothing mysterious about the word 'taxpayer' as there is 'government'. Too many people think of government as a dispenser of bounty from some mysterious and bottomless treasure chest. That bottomless treasure chest is the taxpayer's pocket.

"The more the people depend upon any unit of government as a dispenser of money, the sounder they are rocking themselves to sleep in the belief that they are living in Utopia County in the State of Paradise.

"But what a shock they are going to get when the bottom falls out of that old chair and they are sent sprawling on the floor, with a sickening awakening."

Public Works Committees Take Over Roads in Congress

When President Truman signed the Legislative Reorganization Act on August 2, 1946, he sounded the death knell for a number of Congressional committees, among them the House and Senate Roads Committees. In the future, their work will come under the scope of a Committee on Public Works set up in each branch of Congress. The Senate committee will comprise 13 members, and its House counterpart, 27.

Proposed legislation relating to the construction or maintenance of roads and post roads, to flood control, the improvement of rivers and harbors, water power, public works for the benefit of navigation, bridges and dams, etc., will come under the jurisdiction of the Public Works Committees, as will bills relative to Governmental buildings and lands.

Under the new Congressional organization, standing committees will be elected at the beginning of each Congress. Also, the chairman of the committees will be chosen by their colleagues in each chamber. Representatives as a rule will be limited to duty on one standing committee, and Senators, with minor exceptions, cannot serve on more than two bodies.

While the manner in which these new committees will function has yet to be outlined, the American Road Builders' Association expects that their work will be carried on by numerous subcommittees. In all likelihood there will be a subcommittee on roads as part of each Public Works Committee.

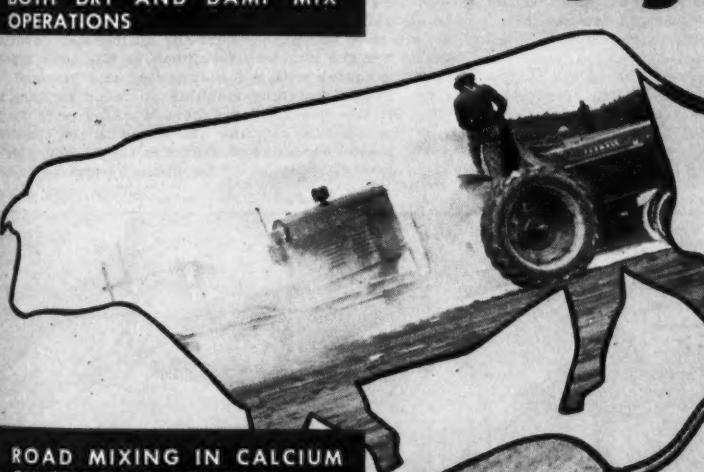
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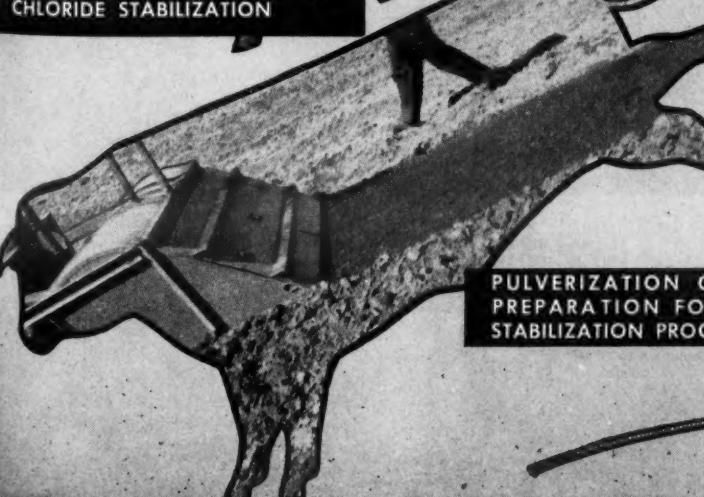
SOIL-CEMENT ROAD MIXING IN BOTH DRY AND DAMP MIX OPERATIONS



SOIL-CEMENT ROAD MIXING IN BOTH DRY AND DAMP MIX OPERATIONS

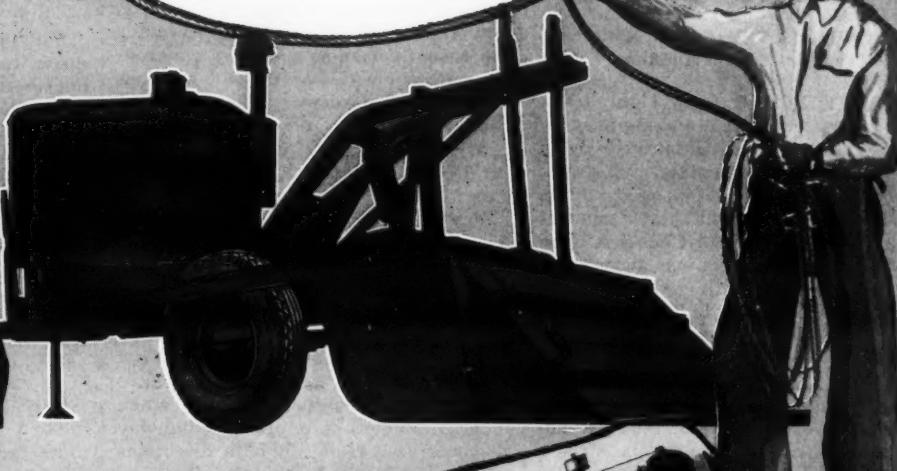


ROAD MIXING IN CALCIUM CHLORIDE STABILIZATION

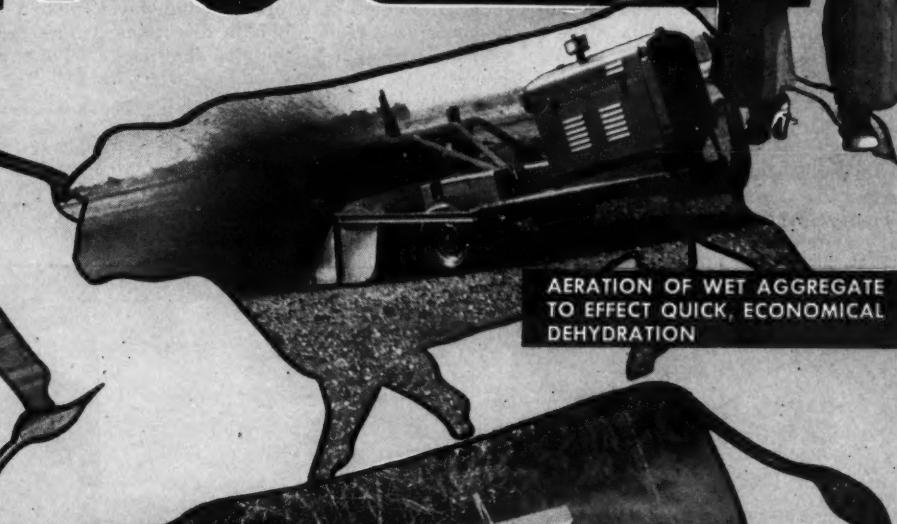


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C. & E. M. Photos

Widening a section of U. S. 13 in Delaware began with a Caterpillar power grader cutting the trench. 1. With the 12-foot grader blade set at a 45-degree angle, the operator made three passes to cut the 8-inch depth; a 6-foot width provided 2 feet for setting the forms for the 4-foot concrete strip. 2. After the Heltzel forms were set, a 5-ton tandem Buffalo-Springfield rolled the grade, also pulling along a fine-grader on four wheels.

Concrete Strip Added In Road Improvement

Concrete Highway Patched And Widened 4 Feet Prior To Hot-Mix Surfacing On 7-Mile Contract

By WILLIAM H. QUIRK, Editor
and Eastern Field Editor

♦ A SECTION of U. S. 13, highly traveled north-south concrete highway in Delaware, has been improved by a 7-mile patching, widening, and resurfacing contract. The improved stretch lies between Bridgeville and Farmington in Sussex and Kent Counties. The contract for the project was awarded to the Standard Bitulithic Co. of New York City on its low bid of \$221,787.50 by the Delaware State Highway Department. Work was started in October, 1945. Before winter halted construction operations, the patching was finished; also, considerable progress had been made in grading a 3-mile stretch at the south end of the job in a start towards an eventual dual highway. Large portions of U. S. 13 through Delaware carry opposing traffic on divided lanes, and other important sections are being readied for that type of construction as the necessary funds and sufficient right-of-way become available.

Originally the section under contract was a 16-foot concrete pavement built in 1922 with a 6-8-6-inch cross section. Eight years ago it was widened 4 feet on the east side with an 8-inch uniform strip of concrete. Similar widening is now repeated on the west side, under the recent contract, making a concrete base 24 feet wide for the hot-mix resurfacing. The former 8-foot width of shoulder is being retained in the improvement.

Grading and Patching

The only work involved in this contract which had to do with the dual-highway section was 40,000 yards of earth work, which was moved to complete a 3-mile stretch of 22-foot roadway with 10-foot shoulders for contemplated southbound traffic. That roadway will be continued in future contracts and eventually paved. When it is completed, the present highway now carrying traffic in both directions will be used as a northbound lane exclusively.

The grading item was included in the present contract when the Highway Department successfully completed negotiations for an additional 100 feet of right-of-way adjacent to the original 60-foot taking. The grading was done by a Bucyrus-Erie 6-yard scraper

pulled by an International TD-14 tractor; a Caterpillar power grader shaped the roadway and the 4 on 1 slopes. A 50-foot parkway, seeded for the center 30 feet, will divide the opposing lanes of traffic. The center of this strip will be depressed 28 inches below the center-line pavement grade.

Patching of the old concrete pavement was done a lane at a time so as not to interfere with traffic. Patches were placed to the same thickness as the original pavement and were usually under 30 feet in length. When they were over 30 feet long, the patches were considered as cement-concrete base course. They had double thicknesses of tar-treated paper embedded to half the slab depth at 15-foot spacings in a system of crack control. The paper was forced down into the soft concrete by a steel straight-edge, and the edges finished off with a trowel. After the concrete had set, these contraction joints were poured with asphalt.

3. Dry batches for the widening-strip concrete were delivered by truck to the MultiFoote 27-E paver which operated on the outside lane of the pavement. Here a Ford truck with a Galion body dump its load into the paver skip. 4. Paving operations are in full swing. At the right, batch trucks are ready to deliver to the paver. Next the MultiFoote deposits concrete in the metal spreader box. Water for the mix was furnished by the tank truck. At the extreme left is the Heltzel finishing machine with a 5-foot screed and powered by a Novo engine. 5. Two helpers aided the Heltzel finishing-machine operator by keeping concrete in front of the screed. In the rear are the hand finishers working with long-handled 10-foot straight-edges. 6. For curing, calcium chloride was added to the concrete mix. In addition, burlap was laid over the fresh concrete and kept wet for 24 hours by a tank truck with a 5-foot spray bar extending out over the widening strip.

C. & E. M. Photos

Widening Trench

Work on the widening strip started on March 15 this year. A Caterpillar power grader dug the trench for the 4 feet of additional concrete 8 inches thick. With its 12-foot blade set at a 45-degree angle, the grader cut out a trench 6 feet wide, the extra 2 feet affording room for setting forms. Three passes of the grader were usually required before the 8-inch depth was attained; the final cut skimmed off very little material as an effort was made for exact grade. The excavated material was piled in a windrow on the shoulder line.

On the job was a total of 4,500 feet of Heltzel forms. These were generally set up all at one time as the average daily pour in 9 hours was 2,300 feet. Thus a sufficient length of forms was always ahead of the paver each morning, even before the forms from the preceding day's pour had been moved

(Continued on next page)



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Concrete Strip Added In Road Improvement

(Continued from preceding page)

up and placed. After a crew of eight had set the forms, the grade was rolled by a Buffalo-Springfield 5-ton tandem roller which just fit within the form trench. As the roller moved along, it pulled a grader rolling on four wheels, two on the form and two on the pavement, which did the fine grading to an exact 8-inch depth. This was followed by a small roller pulled by hand, after which the grade was given a final check with a scratch board. The trench was prepared with a $\frac{3}{4}$ -inch slope to the outside. During the digging, holes were left in the windrow at 200-foot intervals for drainage in case of rain.

Concrete Pouring

Concrete for the widening strip was mixed in a MultiFoote 27-E single-drum paver working along the outside lane. Traffic was maintained in both directions on the other lane with the help of two flagmen. Dry batches were brought to the paver by a fleet of seven trucks, six Fords and one Dodge. These were hired by the hour and hauled two 6-bag batches each an average distance of 3 miles from the contractor's plant at Greenwood, about midway of the job. According to the specifications, cement could not be emptied into the batch trucks. So it was added at the paver skip by two men who tossed the paper bags of cement on top of the sand and stone, cut them open with shovels, emptied their contents, and threw the empty bags to one side. Another man, who also wet down the subgrade with water from the paver, gathered the empty paper bags into piles for disposal.

Water for the mix, about 27½ gallons for each batch, and for the grade was brought to the scene of operations in a 1,250-gallon tank mounted on a GMC truck. The tank was filled at a stream near the center of the project by a Jaeger 4-inch pump. This tank unit was a former gasoline-tank truck; it was still equipped with a hook-up for a gasoline pump by means of which the water was transferred to a 1,000-gallon tank mounted on a Mack truck. The paver pulled the latter truck along by means of a 1½-inch pipe connection attached to the steering gear of the truck so that it would track. From this tank a Barnes pump, powered by a Briggs & Stratton engine and mounted on the Mack, pumped water through a 1½-inch line to the tank of the MultiFoote.

To aid in curing the concrete, a solution of calcium chloride was added to the mix at the paver. On a platform at the opposite side of the paver from the operator, two 54-gallon drums were set up with a bolt piercing each of them at the 26-gallon level mark. Water was admitted to this point. Then 200 pounds of Dowflake calcium chloride was added and dissolved to meet the requirements: 100 pounds of chloride to 13 gallons of water solution. The two drums were necessary so that the solution from one could be used while the powder was being mixed and dissolved in the other. To each 6-bag batch, 9 quarts of the solution was added. In order to get the exact amount, a 10-quart pail was used with perforations cut into its sides at the 9-quart level; in this way, the excess flowed out after the pail was dipped into the drum.

Batches were mixed 1½ minutes, then run out on the 18-foot paver boom and deposited in a spreader box pulled by the paver. The metal box riding on top of the steel form and pavement was 8 feet long x 4 feet wide at the bottom; it flared out to 6 feet at the top to facilitate dumping the concrete into the trench and to avoid any spilling over on

the sides. At the rear of the box was a flat metal plate extending the width of the pour. This vibrated the concrete after it was puddled into place by two men working within the box as it was pulled along. The vibrator was powered by a generator carried on the water-supply truck that was fastened to the paver.

Finishing and Curing

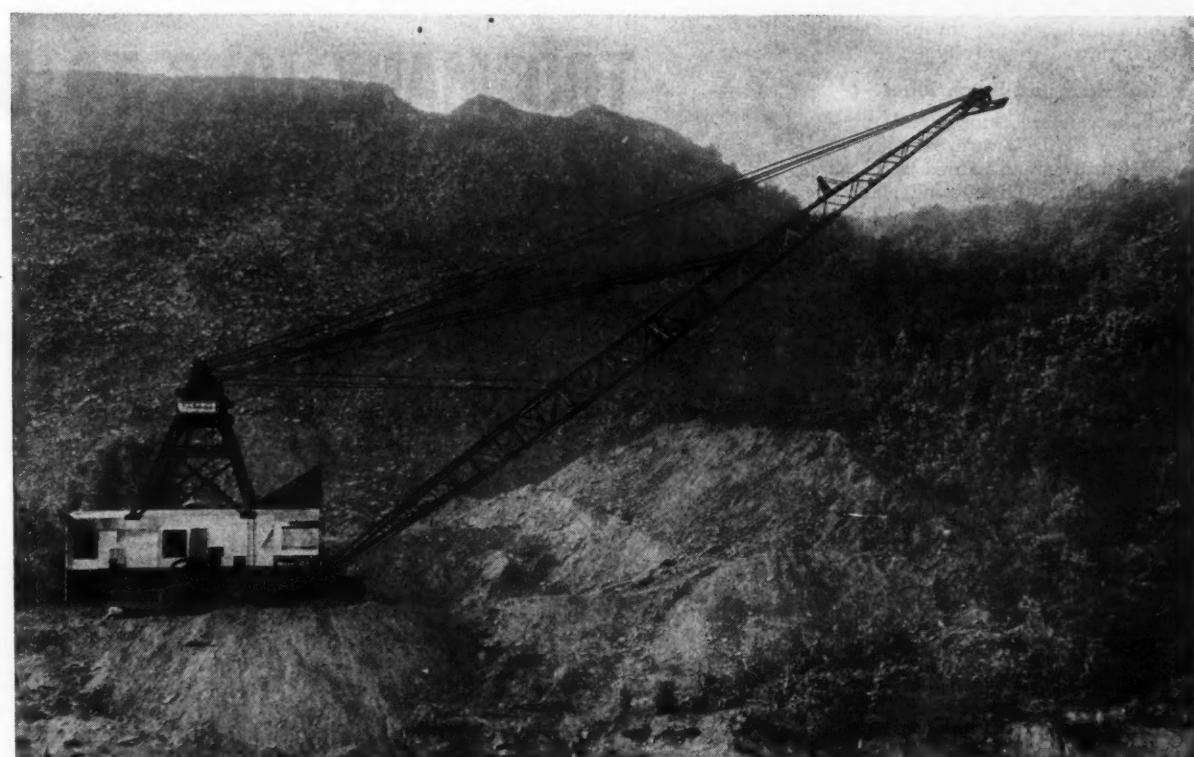
The spreader box worked the concrete roughly into place. The Heltzel finishing machine, powered by a Novo engine, and equipped with a 5-foot screed, followed closely behind. Although this strip was to be covered with a black-top surfacing, care was taken to give it a smooth riding surface. The finishing-machine operator had two helpers who saw that material was kept in front of the screed; also, in back of the machine were two finishers with long-handled 10-foot straight-edges who checked continually for any high or low spots as they would if a full-width pavement were being laid. They



C. & E. M. Photo
At the contractor's batch plant for a widening project on U.S. 13 in Delaware, a Speedcrane with a 45-foot boom and Hayward 1-yard clamshell loaded aggregate to a Blaw-Knox 105-ton 3-compartment bin.

then rounded off the edges using a $\frac{1}{2}$ -inch-radius tool next to the pavement, and a $\frac{3}{4}$ -inch-radius tool on the

outside edge.
Besides the calcium chloride in the
(Concluded on next page)



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explaining this con-
struction equipment
financing plan.

Concrete Strip Added In Road Improvement

(Continued from preceding page)

mix, the concrete was further cured with burlap strips which were kept wet for 24 hours. As these strips were not permitted to be dragged around on the ground from place to place, a special carrier was made for them. It consisted of a chassis with four rubber-tired wheels. On it was mounted a wooden trough 16 feet long x 4 feet wide x 8 inches deep, in which the burlap was placed and then soaked with water. This carrier was pulled along by the finishers who placed the burlap on the concrete. Further wetting of the strip was done from a 1,000-gallon tank mounted on an International truck. As the truck drove along on the original concrete, the 5-foot spray bar with which it was equipped extended out over the new paving. The extension consisted of a $\frac{3}{4}$ -inch pipe with $\frac{3}{8}$ -inch holes on 1-inch centers; through these the water flowed by gravity.

Materials and Batch Plant

Dowflake calcium chloride was purchased from the Delaware Sand Co. at Georgetown, Del., and hauled in trucks to the contractor's Greenwood plant a distance of about 17 miles. From there the 100-pound paper sacks were hauled to the paver as needed, along with the cement. The cement was delivered to the Pennsylvania Railroad siding of the plant in freight cars shipped from the Lehigh Portland Cement Co. at Fogelsville, Pa. Sand came from the Delaware Sand Co., Georgetown, Del., and stone from the General Crushed Stone Co. at Glen Mills, Pa.

The aggregate was unloaded from gondola cars at the siding and stockpiled by a Speedcrane with a 45-foot boom and a Hayward 1-yard clamshell bucket. From the piles the crane loaded a Blaw-Knox 105-ton 3-compartment bin, situated between the sand and the stone. The batch trucks pulled under it as they were loaded, with the materials being weighed on a beam scale. A typical batch by dry weight for the concrete base course used in the strip widening consisted of:

Cement	564 lbs.
Sand	1,205 lbs.
Stone	2,182 lbs.

For each bag of cement in this 6-bag batch, $\frac{5}{8}$ gallons of water were added to yield 1 cubic yard of concrete to the batch.

The coarse aggregate was made up of two different grades of stone used with equal parts in the mix. The gradation of the three types of aggregates in a typical batch is as follows:

Sieve Size	Per Cent Passing		
	106 Stone	106-A Stone	Sand
2-inch	100.0	....	....
$\frac{1}{2}$ -inch	58.6	....	....
$\frac{1}{4}$ -inch	....	100.0	....
1-inch	6.2	94.9	....
$\frac{1}{2}$ -inch	....	35.5	....
No. 4	1.2	1.5	98.0
No. 8	....	....	81.6
No. 14	....	....	66.0
No. 28	....	....	46.6
No. 48	....	....	16.5
No. 100	....	....	5.2

During the concreting operations, 5 men were employed at the batch plant, about 12 on the forms and grade, and 25 at the paver, including the finishers. Drinking water for the men came from the water supply of town's along the way, and was dispensed in Vee paper cups from Indian 5-gallon water carriers.

When the 4-foot strip was completed, the power grader pushed the windrow of dirt back against the new pavement to complete the backfilling of the trench. Additional material, a sandy gravel borrow, was hauled in where necessary to complete the 8-foot shoulders which have a slope of 3 inches. This work progressed with sufficient

speed so that the hot-mix paving started about the middle of May.

Hot-Mix Surface

The bituminous concrete was laid in two courses with two Barber-Greene bituminous finishers working from 100 to 500 feet apart as each spread a 12-foot lane over the concrete base. A smooth center-line joint resulted from this method of operation, but traffic had to be routed over detours during the process. Rolling was done by an 8-ton Buffalo-Springfield roller and a 12-ton 3-axle tandem. The hot-mix was produced in a Warren Brothers asphalt plant with a 50-ton per hour capacity, set up on the railroad siding at Greenwood. The Standard Oil of New Jersey supplied the asphalt from Baltimore.

Originally the Highway Department planned to lay a $\frac{1}{4}$ -inch binder course and a $\frac{1}{4}$ -inch top course over the entire contract. However, after the job was let, the north end of the project gave evidence of further deterioration. So for nearly 4 miles the pavement was

thickened to a $2\frac{1}{2}$ -inch binder and a $1\frac{1}{2}$ -inch top course. The gradation of material for the two courses is as follows:

Sieve Size	Per Cent Passing
Binder	Top
1-inch	95-100
$\frac{1}{2}$ -inch	45-75
$\frac{1}{4}$ -inch	80-100
No. 4	25-45
No. 10	50-65
No. 20	30-45
No. 40	20-30
No. 80	15-25
No. 200	10-20
Asphalt (85 to 100 penetration)	5-10
	5.0
	5.5

Quantities and Personnel

The 3 and 4-inch hot-mix paving was completed in August, and the general clean-up of the road followed soon after. The major items of the contract included:

Earth work	40,000 cu. yds.
Concrete patching	1,590 sq. yds.
Concrete base course (widening)	3,700 cu. yds.
Bituminous concrete	16,000 tons

Richard Raulston was Superintendent for the Standard Bitulithic Co. of New York City. Edward L. King was Chief Inspector in charge of the con-

tract for the Delaware State Highway Department which is headed by W. W. Mack, Chief Engineer, with Wm. A. McWilliams as Assistant Chief Engineer in charge of Construction. The project was in the Third Division of which E. V. Rose is Division Engineer with headquarters at Georgetown.

Tires in Earth-Moving

Earth-moving on some of the nation's greatest construction projects is highlighted in a colorful brochure issued by the B. F. Goodrich Co., manufacturer of Silvertown tires. Pictures of rubber-tired units building roads, dams, flood-control projects, airports, in quarries, etc., show the variety of tasks which Silvertowns are called on to perform. A list of Goodrich tires for contracting is included.

Copies of the booklet, "Moving the Earth", Form 4-7204-GP, can be obtained from Goodrich on mention of this notice. Write the firm at Akron 18, Ohio.

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Moto-Crane mobility makes it independent of all other forms of transportation. Soft ground flotation and high tractive effort give off-the-road travelability that gets this unit to the job whether there's a road or not. When finished it takes off for the next job under its own power over hard roads at speeds up to 31 m.p.h. Its uses are legion — general excavation, car unloading, steel erecting, ditching, bin charging, pile driving, etc.

Put a Moto-Crane to work and mobilize those scattered jobs into one efficient operation. There is a wide range of models and capacities to choose from mounted on 4 or 6 wheel units with or without front wheel drive. Ask your local Lorain distributor for complete Moto-Crane information today.

The new 20-ton 6-wheel drive Moto-Crane.

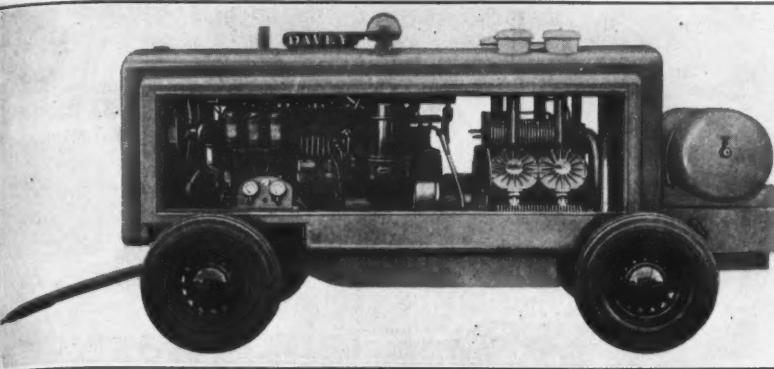


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The first of the 1947 line of Davey air compressors, featured by an entirely new design for cooler operation and greater efficiency, is this 315-cfm model.

New Design Reduces Compressor Vibration

A radically new departure in Davey design marks the first model in its 1947 line of air compressors, says the Davey Compressor Co., No. Water St., Kent, Ohio. The new machine produces 315 cubic feet of free air per minute at 100-pound pressure.

Two banks of three cylinders, each bank arranged in W form, characterize the new compressor unit. This construction, together with a short 4-inch piston stroke, is designed to reduce vibration to a minimum and provide a cooler-operating, more efficient machine. The compressor's four low-pressure cylinders are fitted with individual air cleaners to cool cylinders and heads during idling.

The design is also said to permit substantial reduction in the dimensions and weight. Gasoline-driven models have a 140-inch overall length. Diesel units are a foot longer. Each model is 72 inches high and 65 wide. The gasoline unit weighs 7,400 pounds, and the diesel, 7,800. Aluminum and aluminum alloys are used for weight reduction where possible.

Standard skid, steel-wheel trailer, pneumatic-tired trailer, and flanged-wheel mountings are available. Spring-mounting is supplied on trailers without added cost. Side tool boxes feature all models. The gas tank is located beneath the air receiver. Suspending springs at the sides of the frame lower the machine's overall height and center of gravity.

Write the Davey Compressor Co. for further details about this new compressor, and mention having seen this story.

Panama Is Expanding Road System Steadily

Approximately 41 miles of roads were constructed in the Republic of Panama during 1945, chiefly in Chiriqui, Coche, and Panama Provinces. The country now has roughly 1,100 miles of transitable roads, about one-third of which are unimproved routes. About 350 miles of road are gravel, 220 macadam, and 125 concrete.

The Panamanian Government's Section of Roads, Streets, and Wharves spent \$635,890 on eight road-building projects at various points in the interior during the first nine months of 1945. The 1945-46 budget calls for \$4,137,290. Under consideration by the Government is a "corridor road" from Colon



for by the Republic of Panama at a cost of less than \$2,000,000.

During 1945 no progress was made on the Inter-American Highway, *Foreign Commerce Weekly* reports. Panamanian and U. S. Public Roads Administration engineers are studying this project.

Firms Licensed to Make Hi-Bond Reinforcing Bars

Greater quantities of Hi-Bond reinforcing bar for concrete construction will be available in the future, the Inland Steel Co. has announced. Carnegie-Illinois and other subsidiaries of the U. S. Steel Corp. have been licensed to manufacture and sell the reinforcing product. They will receive technical assistance from Inland engineers in putting the bar into production.

Hi-Bond reinforcing bars were first announced in 1943. They are characterized by an unusual arrangement of reverse helical ribs to provide a maximum bond between the steel and the concrete.

Rotary-Snow-Plow Data

Snow fighting on street and highway is shown by Sicard Industries, Inc., in a folder devoted to its Snow-Blower, a rotary snow plow. An extensive file of photographs is included in this folder. They show the unit blowing snow left or right a distance of up to 150 feet; they also show it loading trucks through its telescopic and revolving loading chute hydraulically controlled from the cab. Text points out labor and money-saving features of the Snow-Blower, and the fact that the chassis can be stripped of its snow equipment for other employment such as watering and dumping during summer months.

Sicard Industries will be glad to send this folder as an aid in planning your equipment set-up for snow control. The firm is at present able to deliver Snow-Blower units in about 20 weeks. Write Sicard at 753 W. Main St., Watertown, N. Y., for full details, and mention this notice.



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Premolded **KORK-PAK** *Fiber*
- EXPANSION JOINT -
Watertight, Non-Extruding, Resilient

KORK-PAK is the general purpose Premolded Expansion Joint Filler used in many places in preference to the ordinary fiber joint and to decidedly better advantage. The outstanding features are—it handles better, without breakage during shipping and installation, it is more rigid for all dowel bar assemblies, more resilient and has far less absorption, consequently more economical for use on all types of work. Every engineer today knows that the first requisites to consider in a good Expansion Joint are Resilience, Non-extrusion, Non-absorption and permanence. All these advantages are obtained at relatively low cost, by the use of Kork-Pak.

LIGHT SEGMENTS are PARTICLES of RESILIENT CORK and FIBER

DARK PORTION Shows SPONGY EFFECT of BITUMINOUS waterproof PACK

Cross Section View of Servicised: KORK-PAK Joint.

FOR PROMPT DELIVERY

Large stocks of raw material are kept on hand at all times which assures reasonably prompt deliveries after receipt of orders. Kork-Pak is being manufactured and Pioneered exclusively by Servicised Products Corp. and distributed solely by them and their authorized representatives throughout the country in their respective territories.

CONSTRUCTION AND SPECIFICATION

Kork-Pak Fiber Joint is constructed of Bitumen, Cork and Fiber content—preformed and encased between two felt strips giving it strength and adequate rigidity for handling, cut to required lengths and widths ready for immediate and easy installation. It is practically non-absorbent (Maximum of 8% absorption) against 15% considered normal. Recovers after 50% compression to 75% of original thickness. Extrusion at 50% compression limited to 1/4 inch. Kork-Pak is scientifically constructed of A-1 materials to bring about better results, less wastage, at a minimum of cost. Servicised again demonstrates its originality and ability to serve its customers at a time, of "shortages" with standard products measuring up to and better than the Specifications required by AASHO M 59-42. Write today for further details or expert information from our Engineering Dept.



SERVICISED PRODUCTS CORP.
6051 West 65th Street, Chicago 38, Ill.

Channel Is Dredged To Vital Lumber Port

Hydraulic Dredge Moves 572,000 Yards to Deepen Willapa Waterway System; \$177,320 Contract

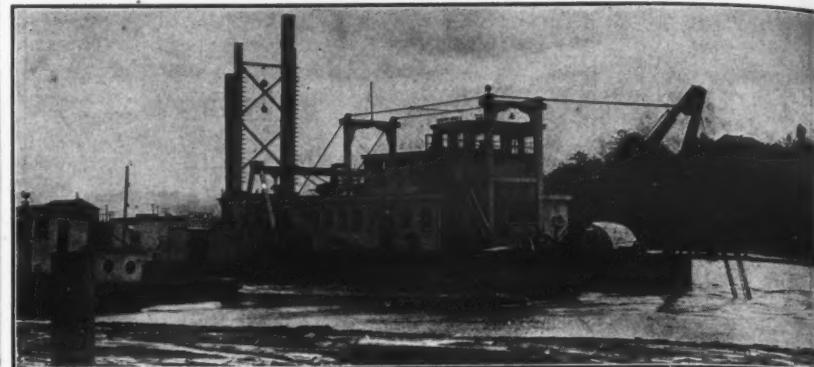
♦ A RIVER and harbor dredging job to reopen a deep-water ship channel 24 feet below mean lower low water was recently completed at Willapa River and Harbor near the city of Raymond, Wash., in the Pacific Northwest. Designed to accommodate vessels laden with lumber from the mills in that district, the project was one of the first important civil post-war jobs which the Seattle District Office of the U. S. Engineer Department has conducted by contract. The \$177,320 job held by Grays Harbor Construction Co. was scheduled for completion September 1, 1946, according to Col. Conrad P. Hardy, Seattle District Engineer.

The past history of Willapa River and its mouth has been a story of a maintenance battle. Ships have used that river for many years. Serious silting in the river bed, rock ledges, and a variety of other materials have contributed their share towards making it difficult for dredges to work there. With the exception of some war work in connection with an airport near Raymond, since 1934 hydraulic pipe-line dredges have not worked in the district now being dredged by the 24-inch Robert Gray. The U. S. Engineers have used some hopper dredges in the past. But hopper dredges will not remove hemlock stumps.

Willapa (pronounced Willa-Paw) River flows through hemlock country. Field parties making preliminary explorations found hemlock stumps scattered along the channel bottom; they also found heavy gravel, sand, soapstone, mud, clay, peat moss, brown sandstone, and some oyster beds. The hemlock stumps were destined to become one of the biggest nuisances of the job, and when the U. S. Engineer Office prepared its own estimate it figured on a "dirty" dredging job—one loaded with sound causes for shutdowns. As if that were not enough, the 200-foot channel contained about 572,000 cubic yards in

shoals aggregating a distance of 30,000 feet.

When the contract was let to Grays Harbor Construction Co. on January 4, there were no contract dredges in the vicinity. The Robert Gray was municipally owned by the Port of Grays Harbor, Wash. It had stayed at home, so to speak, since it was built in 1937, establishing the Grays Harbor channel and maintaining it. Its owner certainly was not out to compete with dredging contractors. But during the war the shortage of dredges became so acute that the Robert Gray was called upon to dig 3,000,000 cubic yards to build the Moon Island Airport for the Navy. When the shortage of machines continued into the post-war period, the Grays Harbor contracting firm per-



C. & E. M. Photo
The all-electric 24-inch hydraulic dredge Robert Gray had an exciting 57-mile sea voyage before starting work in Willapa Harbor.

suaded the Port of Grays Harbor to lease the machine on a subcontracting basis to dig the Willapa job.

The Robert Gray is all-electric. The kind of power she needed wasn't available by 7.3 miles. So while the dredge was being made ready for the 57-mile trip, the dredge owner built a tempo-

rary 13-kilovolt transmission line from one of the Bonneville Dam transmission lines, and brought power in where needed. A transformer bank was installed at the Bonneville line, stepping the current down from 33,000 to 13,000 volts. After it reached the end of the

(Continued on next page)

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Sinclair OPALINE TBT Motor Oil is made with special additives to fortify it against oxidation tendency under high temperatures, discouraging gum, lacquer and carbon deposits. Special detergent qualities help keep engines clean; inhibitors protect against bearing corrosion and foaming.

Try this *extra-duty* oil for *extra-duty* service. It's made in grades to suit varied engine designs and operating requirements.

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FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

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THAWING TORCH LATER!

Put this powerful 200° F. flame to work right NOW to repair roof blisters, dry molds, dry up wet spots, preheat—end on a hundred other jobs! Use it later when cold waves strike to thaw frozen pipes, pumps, switches, culverts, equipment of all kinds. One-year guarantee. IMMEDIATE delivery. Complete outfit includes: All-welded, corrugated tank; Brass Pump; 60-lb. pressure gauge; 7-ft. oil resist. hose; needle valve strainer; seamless steel coil; etc.

5 GAL. GIANT	Flame: 4" x 36". Fuel cons. 1 1/4 gal. per hr. Eqpt. with filler cap air release.....	\$27.25
4 GAL. SENIOR	Flame: 3" x 30". Fuel cons. 1 gal. per hr. Handy web shoulder strap. No fill cap.	\$22

10 Day Trial

Aeroil Products Co.
5575 Park Ave.
West New York
New Jersey

Channel Is Dredged To Vital Lumber Port

(Continued from preceding page)

new 7.3-mile line, power went to a transformer scow with a 3-transformer bank. These transformers reduced line voltage to 2,300. It passed at that voltage through 2,200 linear feet of submarine cable with a diameter of 300 circular mils to a reel scow, and then to the dredge.

The 57-Mile Voyage

The 57-mile sea voyage from Grays Harbor to Willapa is not a nice trip for men with weak hearts and stomachs. Extremely rough, dangerous water coils and strikes at floating craft passing over the "banks" outside those two harbors. Captain J. D. Kitchen, genial, weathered, and a little gray, once rode the old Washington No. 3 through a 100-mile-an-hour gale in these waters. Captain Kitchen is now the Superintendent of Dredging for the Port of Grays Harbor. Port Manager W. J. Murphy can also recount many a hazard on this north Pacific Ocean.

Little did either Murphy or Kitchen know that the worst tidal wave of all recorded time was to break near the Aleutian Islands while the Robert Gray was en route. Little did they realize how electrifying it can be, en route in a dredge whose hull is only 120 x 40 x 12 feet, to hear the message crackling through the ether, "Stand by for 90-foot tidal waves!"

Before leaving Grays Harbor they removed the dredge's 30 x 32-inch single-stick Douglas fir spuds, which were 86 feet long and weighed more than 10 tons each. They lashed these spuds to the dredge deck and brought a spare along. The spuds made a kind of bulkhead down the sides. The stern was planked in. The cutter, cutter shaft, and 24-inch suction pipe were taken off to lower the center of gravity. The 70-foot ladder, weighing 60 tons and capable of digging to 51 feet, was secured with timbers and a "belly band" of cable over the steel A-frame forward.

Under tow by the diesel tug Henry Foss, powered by a 1,000-hp engine, the Robert Gray was off the Washington coast when the historic tidal wave which damaged Hawaii started roaring at express-train speed across the north Pacific. For a few anxious hours the dredge crew waited for the worst. The full wave effect from the tremendous seismic disturbance sped in almost a straight line from the Kodiak naval base towards Santa Barbara, Calif. Its edges had flattened somewhat when it found the Robert Gray, because the position of the dredge was far eastward.

from that murderous line. The dredge creaked and groaned, the tug bucked a little, but after a little while the pitching subsided. The Gray had weathered a tidal wave.

Dredging Layout

After the spuds and other parts which had been removed for the sea voyage were reinstalled, the Robert Gray started digging on April 8.

Dump areas designated by the U. S. Engineer Department plans called for hydraulic fills to be placed between 3rd and 11th Streets in the town of Raymond, and for Siler Slough back of Willapa Harbor Lumber Mills to be filled. In return for the improvement of Siler Slough, the City of Raymond agreed to build a bulkhead across the slough to hold deposited material and prevent its getting back into Willapa River.

Since the job reached nearly 7 miles, however, other dump areas also had to be designated. So the low ground on the right bank of the river below Raymond and towards the town of South Bend was used as a depositing ground



C. & E. M. Photo
The 2,600 feet of floating line from the Robert Gray was carried on 12 x 24-foot rectangular wood pontoons. Note the safe walk and hand line. The free pieces of rope at regular intervals are for rescue work, if needed, and to lash pontoon timberheads together in rough weather.

for dredged spoil. Dump distances (Continued on next page)

here's the newest—
in *low cost*
aggregate production

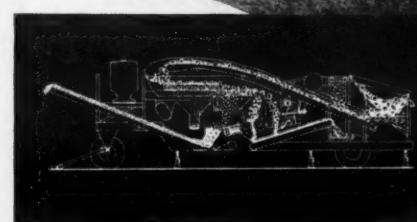


the Cedarapids PITMASTER

IT's also the smallest, complete portable crushing and screening plant that we offer. But there's nothing small about the records of low-cost aggregate production that these new models are making. Operators are reporting production of more than 50 tons per hour of $\frac{1}{2}$ " material with 55% crushing.

Every feature of the new Pitmaster is designed and built to assure low maintenance and low operating costs as well as an exceptionally low first cost. 10" x 16" roller bearing jaw crusher and 16" x 16" roller bearing roll crusher give you plenty of crushing output. Horizontal vibrating screen assures greater capacity, closer grading, higher efficiency and requires less head room. Available with chip screen, hopper and feeder or swivel feed conveyor. Fast, easy set-up and take-down minimize lost time between jobs. No drives to connect. Conveyors swing easily into position.

When buying a crushing plant—buy the best—buy Cedarapids. If your requirements are moderate—buy a Pitmaster.



THE IOWA LINE
of Material Handling Equipment Includes
ROCK AND GRAVEL CRUSHERS
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STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

Iowa Manufacturing Company
Cedar Rapids, Iowa



Channel Is Dredged To Vital Lumber Port

(Continued from preceding page)

ranged from 360 to 5,600 feet, with almost all the combinations in between. About 6,000 linear feet of 20 and 22-inch steel shore pipe in 20-foot sections with slip joints was brought in. Some 2,600 feet of 22-inch floating line in 30 and 60-foot lengths was also towed in; it was mounted on 12 x 24-foot rectangular wood pontoons, one to a 30-foot pipe section. Floating pipe line was joined together by Goodrich rubber-sleeve couplings. At the stern of the dredge this line was connected by means of three pipe nipples and two rubber sleeves.

Dredging Procedure

The Port of Grays Harbor started active dredging by inclosing dump grounds in protective levees. A Bucyrus-Erie 15-B dragline was rented for this purpose, and used with mats where the ground was soggy. Levees were built to final fill elevation by casting the dirt, uncompacted, with the dragline. Wasteways for clear water to drain off were also provided away from the river.

Shore-pipe connections were laid ahead of dredging in an efficient manner. In fact, the job was so laid out and dug that always, at any given time, the next shore connection to be used was always in place, no matter where the dredge was digging.

The channel was flagged by a U. S. Engineer Department survey party operating under the direction of Resident Engineer Audie F. Hampton. Painted targets were set on the center line and both sides of the 200-foot cut, with an allowance made for a 1½ to 1 side slope. With only a few feet of bank in many cases, and never more than 12 feet, side sloping presented no serious problem.

The job had scarcely gotten under way when Murphy and Kitchen realized they would have an even more difficult tussle with those hemlock stumps than they had anticipated. Over the years they had accumulated and silted in, until the bottom of the river out from Willapa Harbor Lumber Mills was a veritable nest of these obstructions. When the dredge began to pump, these hemlock stumps started clogging the 22-inch Pacific Foundry pump. Sticks about 30 inches long and from 4 to 6 inches thick were big enough to cause a shutdown. Despite the fact that the dump ground was littered with splintered, torn pieces of wood which had been chewed up by the cutter and passed through the pump, there were as many more which hung on inside it. An all-time high in discouraging statistics was reached in the 24-hour dredging period May 11, when 104 stops for pump obstructions were logged on the daily dredging report.

Captain Kitchen's pride and joy are the 52 and 54-inch-diameter pump runners with long, gently sloping impeller vanes which he had a part in designing. By burning away part of each of four impeller vanes, he increased the pump opening and cured some of the stump trouble. He did so at the expense of yardage, but the end in this case certainly justified the means.

Two years ago in Grays Harbor, Kitchen and his Chief Engineer, LeRoy Wright, effected another cure which is now paying off in dividends wherever hard material is found. The Robert Gray had been built with a straight jaw coupling on her cutter trunnion just ahead of the 200-hp General Electric motor, which furnishes power through a Western gear-reduction box, ratio 18.75 to 1. The lash in this jaw



C. & E. M. Photo

Excessive scour at the discharge point was prevented by a dispersal table. With loads of about 13 per cent solids at 18-fps velocity, discharged material took a slope of approximately 30 to 1.

coupling was enough to cause rapid wear, excessive heat, and chipping of metal. Several times the Chief Engineer went below to find white-hot slivers of this coupling smoking on the

wooden dredge hull. Repeated failures and wear made it imperative that something be done, but not a gear man in the northwest seemed able to answer this one.

Kitchen and Wright got together and drew up what is laughingly called "Kitchen's Coupling" around the Grays Harbor works. Two flanges were turned out, 20 inches in diameter on 6-inch trunnion shafting. They were joined together by machine bolts with heads spaced alternately. The trouble was cured by drilling the head end of the flange holes oversize, and installing high-grade rubber bushings only in the flange which carried the bolt head. The threaded end was screwed in solidly. This shockproof coupling has operated now for two years with no suggestion of wear, and reduced vibration, wear, and torque on the G-E driving motor.

Dredging in Willapa River presents some other problems. Pacific Ocean tides of 8 feet are common and at least once since the job started, the tidal fluctuation ranged from minus 2 to plus 13 feet. Currents are gentle, however, and this job poses no particular problem of keeping the pipe-line pontoons

(Continued on next page, Col. 4)



TUNE IN THE
TEXACO STAR THEATRE
EVERY SUNDAY NIGHT
— CBS



TEXACO

New 2-2½-Ton Roller Added to Bear Line

The latest addition to the family of Pierce Bear tandem rollers is a 2 to 2½-ton model which will roll right up against a curb or within 1½ inches of a high wall or building, it is stated. Powered by an Allis-Chalmers heavy-duty 4-cylinder 24½-hp industrial engine, the Baby Bear has two paired rolls in front and a single rear roll.

A V-belt drive from the engine to the transmission provides a resilient link in the power train to absorb shocks, peak loads, etc., the manufacturer states. The type of transmission used permits simple operation, by means of a single lever which accomplishes forward and reverse directions. The body is of special new design for small tandem rollers. The paired rolls in front, aggregating a 30-inch face x 30-inch diameter, are made of fabricated and welded steel plates with spacing washers between to permit easy steering. Each half may be ballasted with water. The 36-inch-



The latest addition to the Pierce Bear family is, naturally, the Baby Bear—a 2 to 2½-ton roller.

diameter x 30-inch-face rear roll, also fabricated of welded steel plates, can likewise be ballasted with water.

The sprinkler system consists of two tanks connected together with a total capacity of about 60 gallons, from which the water is conducted by means of a

pipe and rubber hose to both front and rear rolls. The operation of a single valve provides water to both rolls. The flow may be adjusted, in any amount desired, from the driver's seat. The rolls have two scrapers, each below the sprinklers, to assure even distribution of moisture to the roller surface.

Further details on the new 2 to 2½-ton Pierce Bear roller may be secured direct from the Lewis Mfg. Co., 415-431 Hoefgen Ave., San Antonio 6, Texas. Just mention this illustrated description.

Aggregate Driers Shown

The construction features of the Cedar Rapids line of portable and stationary driers are outlined in an 8-page brochure issued by the Iowa Mfg. Co. For all types of mineral aggregates, the driers are available in standard diameters and lengths, gasoline, electric, or diesel-powered. The brochure, Bulletin AP-5, can be obtained on mention of this notice. Just write Iowa Mfg. Co. at 916 No. 16th St., Cedar Rapids, Iowa.



C. & E. M. Photo
A dispersal table made of fir was used at the end of the discharge line.

Channel Is Dredged To Vital Lumber Port

(Continued from preceding page)

afloat.

In order to keep the shore pipe line from "bleeding" sand down the main streets of Raymond through the slip joints, pipe lines were made up extra tight with 5-ton Beebe Brothers hand hoists and cable, and then chinked with shingles if any leaks appeared. The small but powerful Beebe hoist is light enough to be carried around by two laborers, but powerful enough to force a half-ton pipe joint to a watertight fit. Several of these hoists were used on the job.

Where light fills were wanted some distance from the end of the pipe line, bleeder holes were used. But, in general, the pipe line was carried watertight to the discharge point and then scattered on a short fir timber table which prevented excessive scour at the end of the pipe line. With loads of about 13 per cent solids at 18-fps velocity, material thus discharged took a slope of approximately 30 to 1 on the dump.

The bow end of the dredge was moved through winding gear and swing cables attached to steel anchors. A large 5,600-pound anchor was used on the starboard side of the cut, and a 3,900-pound anchor was used on the port side. Swing anchors were moved by anchor scow towed by the tug Rose, which is powered by a 90-hp Atlas Imperial diesel engine. Hoisting power on the anchor scow was furnished by a Skagit hoist driven by a Ford V-8 engine.

This anchor scow was also used to do auxiliary hoisting of pipes and heavy parts around the dredge. Sometimes it was even used as a receptacle for stumps from the pump, which had been removed from the inspection plate on deck. The inspection plate and counterweight were both balanced on a roof beam so that one man could open the manhole, remove a stump, and have the dredge back in operation in less than five minutes. A Cyclone chain hoist helped out with the stubborn cases of stumps lodged tightly.

Auxiliary Equipment

The dredge pump is located on the first deck well above the water line, so two Nash Hytor No. 2 vacuum pumps hooked in series are used to bring water from the cutter in to the pump in starting the dredge. There is a 75-hp General Electric motor on the forward winding gear, with a Fordson engine auxiliary which will turn winding gear and drive a bilge pump in emergencies. A Kohler light plant furnishes auxiliary lighting.

Circulating pumps include a 4 x 5 Myers, a 4-inch rotary pump, a 3-inch single-stage Kimball-Krogh and a double-stage 3-inch Kimball-Krogh.

(Concluded on next page, Col. 3)

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FREE! This 36-page booklet tells all about *Texaco Rustproof Compound*—why it prevents rust, where and how to apply it, and how it can add extra years of life to your equipment. A single suggestion in this book may save you thousands of dollars. Write for your copy today.

Rustproof Compound



This new Amsco all-manganese-steel welded-type dipper is made in $\frac{3}{4}$ to 2-yard capacities inclusive. The body is in two pieces, front and back, welded.

All-Manganese-Steel Welded-Type Dippers

A manganese-steel body has been welded into an operating unit in the new dipper announced by the American Manganese Steel Division of the American Brake Shoe Co. The unit combines optimum durability with overall weight, Amsco says.

When fitted with a door and bail of adequately strong design, this dipper is somewhat lighter than the Amsco Renewable Lip model in use since 1928. Overlapping, rabbeted joints leave grooves for a welded bead in the new design. The parts are fitted together with round plugs, around which weld metal is deposited. This makes the body as strong as if it were made in one piece, Amsco says, while at the same time allowing the replacement of a worn front.

The Amsco manganese-steel dipper is made in capacities from $\frac{3}{4}$ cubic yard up. Sizes 2 yards and under are made in two body pieces, front and back; those over 2 yards are made in four: front, back, and two sides.

You can secure more information on this dipper from the American Manganese Steel Division, 398 E. 14th St., Chicago Heights, Ill., by mentioning this notice.

Vermont Maps Surviving Covered Wooden Bridges

Testifying to the public interest in covered wooden bridges, the Vermont Department of Highways has issued a map showing the location of all the state's surviving wooden structures. Vermont has 168 such bridges, of which 7 are railroad spans, 157 are on public highways, and 4 are privately owned.

Commenting on the high mortality of these bridges, Highway Commissioner

Hubert E. Sargent warns that eventually they will all disappear unless adequate steps are taken to preserve them. They are useless on busy roads, and only 9 of them now remain on the state highway system. But those located on less traveled roads can survive many more years if properly cared for by the local communities, he says.

Garlinghouse Divides Its Various Activities

Its manufacture of concrete-placing equipment, concrete carts, and wheelbarrows, initiated ten years ago, has grown so that the Los Angeles distributing firm, Garlinghouse Brothers, has created the Gar-Bro Mfg. Co. to separate its manufacturing activities from its supply service. Another division, the Gar-Bro Wheel Co., will make pressed-steel wheels for industrial pneumatic and cushion tires. For the present, however, the operations of the three companies will continue at 2416 E. 16th St., Los Angeles.

Channel Is Dredged To Vital Lumber Port

(Continued from preceding page)

centrifugal. These circulating pumps ordinarily furnish water under pressure to the bronze water ring adjacent to the packing gland on the main pump; they furnish priming water to the vacuum pump, and can seal the line behind the check or flapper valve. They can also be used to pump the bilge. There is a blacksmith shop, a Carroll & Jamieson lathe, and a Lincoln Electric welding machine.

Pump liners are installed whenever necessary, and the places subject to severest wear are hard-faced. Cast-iron liner plates and hard-faced manganese-steel liners are used.

No quarters were furnished aboard the Robert Gray. The usual crew consisted of Superintendent Kitchen, an operator, an engineer, a mate, two or three deckhands, a tugboat pilot, a levee-shift boss, and three men. In

addition, on the day shift, he used an electrician, a blacksmith, a utility man, a levee foreman, and a small bull-gang of about six men.

Personnel

In addition to those whose names were mentioned, the Willapa project was under the supervision of Colonel Hardy, Corps of Engineers, District Engineer. W. J. Murphy is Port Manager of the Port of Grays Harbor. Completion of this important job in September once more opened up the Willapa River channel to vessels anxious to get up to the mills for loads of much-needed lumber from this region.

Dealer Serves Louisiana

The C. B. Skinner Co. now represents a number of national manufacturers from its offices in New Orleans. General Excavator, Davenport-Besler, Hercules Motors, Osgood Co., Oshkosh Motor Truck, Dean Hill Pump, Wagener Steam Pump, and other lines are carried.

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California Division of Highways Photo
The deep snows in Donner Pass require heavy-duty equipment. Snogos are used to buck the drifts.

Snow, 588 Inches of It, Is Plowed in Peak Year

(Continued from page 1)

strict reach an elevation of 7,300 feet above sea level. Those which are subject to the danger of snow are U. S. 40 from Auburn to the Nevada State line; U. S. 50 from Placerville to the Nevada line; and state highways around the Lake Tahoe Basin. Up at the very top of Donner Pass, U. S. 40 travels through an open cut with $\frac{1}{2}$ to 1 rock walls nearly 40 feet high. When it snows the winds swirl through this short pass as if in a wind tunnel. They drift the snow in the pass or sometimes, by caprice and whimsy, they blow it all out of the pass. No one can ever tell. Everyone must be prepared. Sometimes the snow even comes on down below Auburn or Colfax, where it ordinarily stops about elevation 1,500. Every winter every man on the District III maintenance forces in these sections works on snow removal; and during this season, the State has to hire additional labor to help out.

Old Methods and New

The work of snow removal through this crucial Donner Summit section began back in 1929 and 1930. Some of the early snow-removal methods were a far cry from those used to fight the white menace today, but the personal bravery and exploits of that other day are still recounted around the shops. Like the time that Carl Weeks, a maintenance superintendent, crawled through a blinding storm on his hands and knees to the top of Donner Summit, to direct snow-removal work in 20-below-zero temperature, with an arctic blizzard swirling snow around his sheepskin collar and the icy hoarfrost gathering on his eyelashes. When one of those blizzards strikes, a man can blink his eyes and have his lashes freeze together.

During the 1930's snow-removal equipment was modernized until today it is the last word in specialization. And in this day and age, orders are relayed by radio from land stations at Marysville, Donner Summit, Yuba Pass, Echo Summit, or Truckee, on a wave length of 27.26 megacycles. All the District's Snogos have radios with receiving and sending sets. So have the maintenance superintendents. As the weather reports come in on regular news broadcasts, all maintenance men listen and are governed accordingly.

The Maintenance Organization

Mr. Child, the District III Maintenance Engineer, has four superintendents. T. T. Buell, with a crew of about 120 men and operators, is the Superintendent at Truckee, California. E. D. Willis at Placerville ordinarily will not use over 40 men. H. T. Bigelow at Nevada City uses 20. And down at Chico, where R. L. Hollis is located, the

situation is mild enough to be handled by one push plow. All these superintendents divide the work equally among section foremen. Foreman through all the years of snow removal at critical Donner Summit has been efficient and hard-working Oscar Beach.

Equipment is secured on a rental basis from the Headquarters Shop of the Equipment Department. All repairs are done by that department, but the lubrication, fueling, and routine adjustments are made by the operators of Mr. Child's maintenance crews.

Equipment and Procedure

When snow begins to fall, usually in October or November, the maintenance crews have their push plows and Snogos in tiptop condition and spotted strategically at the locations where snow is first expected. District III uses 6 Snogos and 13 push plows at Donner Pass. The push plows there are Wau-saus, Frinks, and Sierras. Around Placerville they use 7 Baker and North Star push plows and 2 Snogos. There

are also 5 more Sierra and American push plows around the District, as well as about 30 trucks, 6 Adams, Caterpillar and Galion motor graders, and a D6 Caterpillar with a LeTourneau Angle-dozzer. Two of the Snogos have been purchased since World War II.

In a state-highway-maintenance organization, it is neither wise nor economical to purchase more snow-removal equipment than that actually needed

to take care of normal snows, working at a fair per cent of capacity. Reserve capacity, personal initiative, good management, and a number of other very important intangibles have to make up the difference in case more snow falls than this average amount. That is the principle upon which Mr. Child has operated so successfully through C. H. Whitmore, District Engineer at Marys-

(Concluded on next page)

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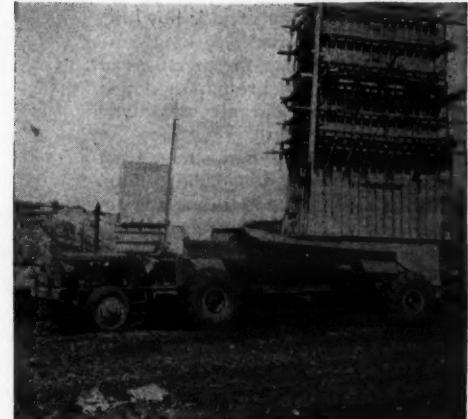
The large, full length and width trailer doors open instantly by gravity—they are unlocked by operation of an air valve on the steering column. Smooth, steep hopper sides of the Bottom-Dump Euclid shed the load quickly and cleanly. Adjustment of the door opening permits dumping the load in long windrows or large heaps on the fill, depending on the job requirements.

Doors are closed by engaging a driving wheel with the left trailer tire which winds the door cable on a drum of the control assembly. In a short travel distance the doors are fully closed and locked in position—driving wheel of the door control is then automatically disengaged from the tire.

The simple but rugged construction of the famous Euclid door control... its reliable performance and long life... is typical of Euclid features that result in lower hauling costs for leading contractors and industrial owners. Your Euclid distributor will be glad to provide facts and figures on what Euclids can do for you.

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The big, sturdy hopper of the Bottom-Dump Euclid is wedge-shaped to place a large part of the payload on the drive wheels for proper weight distribution and improved traction. The shallow load over the trailer wheels is discharged first, thus maintaining maximum traction on drive wheels until the complete load is discharged from the hopper.



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California Division of Highways Photo

In mid-April, skis are needed to reach the Division of Highways gasoline and oil storage house at the Echo Summit maintenance station.

Snow, 588 Inches of It, Is Plowed in Peak Year

(Continued from preceding page)

ville, and T. H. Dennis, State Maintenance Engineer, at Sacramento.

As soon as a blanket of snow builds up to cover the road, the push plows work it off to each shoulder. As the snow keeps falling, they keep working it over to these windrows, and the windrows naturally start crowding in on the highway. Then the Snogos come in and slice part or all of the windrows away, tossing the snow off to one side. As a rule the push plows work hard while it snows, and the Snogos do their part after the storm but while the windrows of snow are deep along the roads.

Some of the Problems

High winds in the California mountains complicate the snow-removal picture considerably. They drift snow in an incredibly short period of time. They obscure the vision of snow fighters and the unlucky motorists who may be caught in such a storm. When these storms come, the maintenance superintendents have to assign patrol cars to lead convoys of traffic over the snowy highways. Sometimes there is a lead patrol car, one in the middle of the convoy, and one trailing. An unseen danger, even when the wind is howling, is carbon monoxide in these long convoys. More than once the alertness of a convoy driver has brought a doped driver out in the clear air and away from the brink of death.

If icing starts, maintenance men erect a gate across the highway and put up one of two signs. If conditions are not too bad, one of the signs merely suggests that chains be put on. If the road becomes dangerous, a sign is put up making chains mandatory and cars without them are turned back. However, the State maintains piles of screenings along these hills, and when icing begins trucks haul the sand to the highways. Most of the time salt is mixed with this material to keep it from freezing, and the salt helps to clear the pavement. No damaging action has ever been noticed, though occasionally on older sections of concrete pavement a little chipping has occurred from freezing and thawing.

First things come first, and in case of a really bad storm far beyond the capacity of the machines, the Department simply allows certain little-traveled roads to snow in. Around the west shore of Lake Tahoe, where there is little winter travel anyway and where bad rock slides often exist in conjunction with snow drifts, they have let the snow win on a few occasions, and concentrated snow-removal equipment on more important roads. On U. S. 40 or 50 it is unusual indeed, even during the worst storms, that travel is blocked to automobiles for more than one to two hours at a time.

Occasionally a big truck slides, then stalls crosswise in the highway, and this blocks highways about as often as does the snow. Then the plows hook on,

and somehow with a little perseverance they get the big monster turned around and on its way again.

Snow-removal crews sometimes work long, arduous hours, though ordinarily the Department tries to keep enough men on hand to give everybody some rest. Three special snow-removal camps with steam-heated sleeping rooms, an

excellent galley, and hot showers are maintained at Yuba Pass Maintenance Station, at Donner Summit, and at Echo Summit, all for the rest and relaxation of hard-working men.

Last season Child's men successfully fought 360 inches of snow which started falling unusually early—October 15, to be exact. The official recording station is at Soda Springs, and the snow pack measured 92 inches there on February 21, 1946. The State made some measurements unofficially at Donner Pass at that same time, and found 110 inches there.

The relatively higher equipment, labor, upkeep, and indirect costs have made the past year's expenditure of \$275,000 seem a bit excessive to Mr. Child in proportion to the amount of snow he removed. It is not as high, however, in relation to general maintenance as is new construction at present.

As a part of maintenance, his forces have developed a highly practical way of taking care of frost boils when they

develop. They simply ramp some snow over even with the top of the boil, and skim the snow off as the frost boil subsides. Sometimes a macadam or bituminous pavement settles back, after being lumpy and rough for several weeks, and becomes once more a fairly smooth and comfortably even highway.

Personnel

The maintenance work of District III is carried on, in addition to the engineers named, under George McCoy, State Highway Engineer, and C. H. Purcell, Director of Public Works.

Vibratory Paving Tube

Full-width full-depth internal vibration of the concrete pavement slab is accomplished with the Jackson vibratory paving tube. Supplied by Jackson Vibrators, Inc., Ludington, Mich., the tube is described in a 6-page folder available to you on request. Mention this notice when writing for the folder. Form Tube 11-44.

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Modernize Old Roads; Then Build New Ones

County Superintendent Disagrees With Public Demand for More New Roads; Improve Old Ones First

THE motoring public demands additional miles of new highways, though it hesitates to provide the necessary funds, declares Ray V. Tilly of Springfield, County Superintendent of Highways of Sangamon County, Ill. It must be educated to the need of first improving existing roads to accommodate modern traffic.

"Due to the character of our soil and the low-type surfaces on our county highway system," says Superintendent Tilly, "we have a high per-mile maintenance cost. We must first improve our present highway system by the construction of higher-type surfaces. Otherwise the construction of new roads will only throw an increased expense and burden upon the County by adding more miles of low-type highways to be maintained."

While the public points with one hand to the necessity of building highways in new locations, it holds its wallet tightly in the other, according to Mr. Tilly. He cites the case of a \$1,900,000 bond issue, only one-third of the bonding power of the county, which was proposed last spring. It would have permitted the construction of roads in new locations and the improvement of existing roads. But the people who would benefit most from such expenditure—the farm group—organized to oppose the proposition. As a result, the County Board abandoned the idea of proceeding with the election for it.

Sangamon County Roads

There are 1,358 miles of highways in Sangamon County, exclusive of those in the state and U. S. highway systems. There are 1,103 miles under the jurisdiction of the 26 township highway systems in the county, and 255 miles in the county highway system. The County Highway Department maintains 203 miles of its system, and the State Highway Department maintains the remainder of the county highways. Of the 203 miles, about 75 per cent of the roads are surfaced with road oil or liquid asphalt, and about 25 per cent are gravel or low-type black-top. County maintenance of its part of the highway system averages about \$700 per mile annually.

Sangamon County is located in south-central Illinois, in the heart of the rich, flat agricultural section of the state. The soil is black loam with gravel almost nonexistent—the type of soil which makes good farm lands but poor highways. This black loam, in which crops thrive, lacks stability and provides an extremely poor subgrade for modern roads. It has high capillarity, so each spring, when the frost goes out, the roadbed becomes spongy and the surfaces fail. This is not a situation, however, which defies correction. A stabilized subgrade of granular mate-

rial in sufficient quantities would go a long way towards solving the spring break-up problem.

There are no quarries and only one commercial gravel pit in the county. This lies in the southeast part, off a railroad, and the cost of widespread use of this material is prohibitive for most sections of the county.

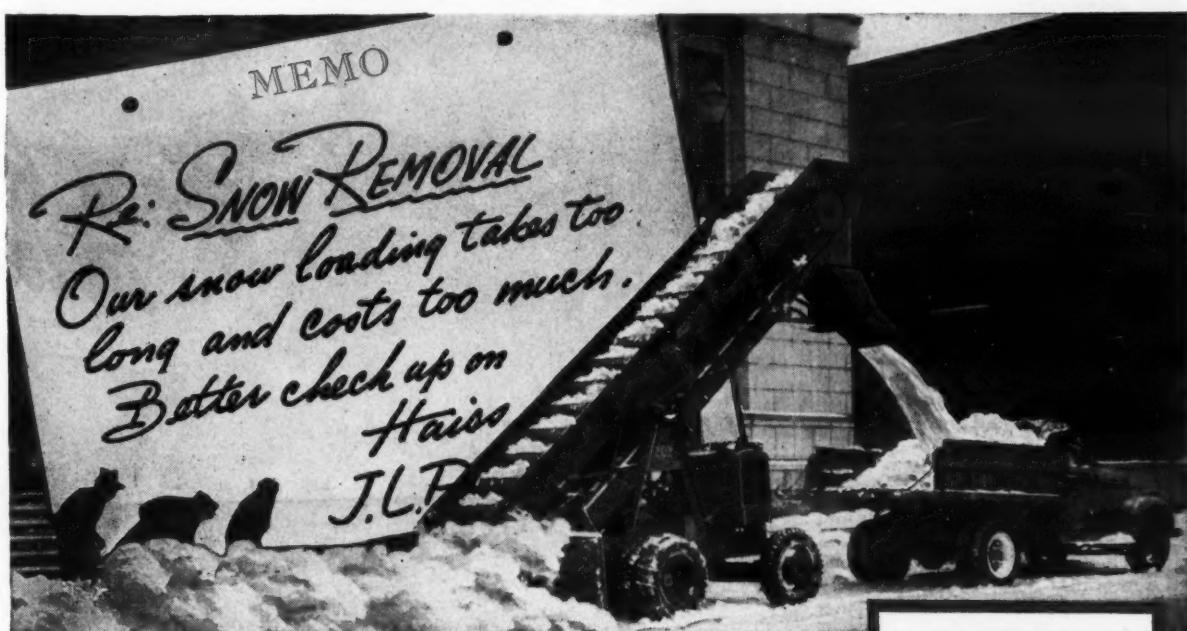
Many miles of county highways were taken into the system 20 to 30 years ago and have never been improved in conformance to engineering plans. As a result, these highways cost much more to maintain than the average highway in the county. All new highways are being constructed with a shoulder-to-shoulder width of 32 feet and with a wearing surface 20 feet wide.



Sangamon County's Austin-Western 99M motor grader windrows asphalt-treated road surfacing on a county highway near Springfield, Ill.

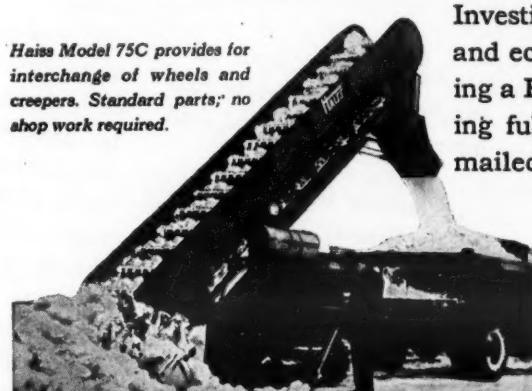
New construction is handled by county forces and by contract, with distribution about evenly divided. During the 1946 construction season, Mr. Tilly expected, when he was inter-

viewed, to build approximately 8 miles of new grade and 4 new bridge sections. The new grades would be treated with road oil, since the public is clamoring (Concluded on next page)



Fix your eyes on a Haiss as it digs in to break-up wet, dry or frozen snow...loading it at better than 10-yards a minute—and you'll see in no time what a difference engineering "know-how" and rugged construction make in a Snow

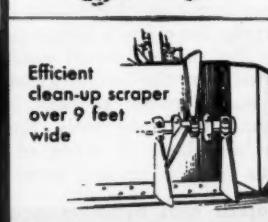
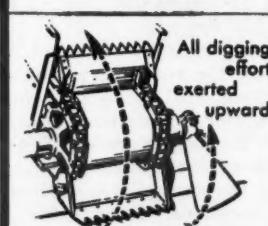
Loader. Built of only the best in alloy steels from simple, functional design...with a Haiss-made oil-bath enclosed transmission—and powered by a motor ready to "take it"—this Haiss Snow Loader is an all-around bargain on the job. Investigate now the efficiency and economy gained by owning a Haiss. Catalogs containing full information will be mailed promptly on request.



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Modernize Old Roads; Then Build New Ones

(Continued from preceding page)

oring for more miles of roads rather than more modern roads. And, as Mr. Tilly says, the public is paying the bill.

Maintenance

The County has an adequate inventory of maintenance equipment, but many items are badly in need of replacement. Although they have been ordered, the matter of delivery dates is rather discouraging. The maintenance equipment of the County consists of:

- 1 Allis-Chalmers motor grader
- 1 Austin-Western motor grader
- 1 Caterpillar motor grader
- 1 Buffalo-Springfield 10-ton roller
- 2 Etnyre asphalt distributors
- 21 trucks
- 1 bus
- 1 Allis-Chalmers Speed Patrol
- 1 40-hp wheel tractor
- 1 Allis-Chalmers 90-hp crawler tractor
- 1 Allis-Chalmers 12-foot power-controlled grader
- 1 Allis-Chalmers tractor with mower
- 2 Allis-Chalmers heavy-duty road disks
- 1 Baker road-roofer plow
- 1 John Deere tandem disk
- 1 Baker maintainer
- 1 Gledhill road shaper
- 1 5-ton roller
- 1 pneumatic-tire roller
- 1 sheepfoot roller
- 2 road scrapers
- 1 portable asphalt kettle
- 2 Buckeye rock spreaders
- 1 LaCrosse 10-ton trailer
- 1 Carver 3-inch water pump
- 1 10-S concrete mixer
- 2 tank-car heaters

Normally, about two-thirds of the earth roads which are treated with road oil or liquid asphalt need to be scarified, resurfaced, and treated each year with approximately 0.4 gallon of liquid material per square yard. The remaining one-third is patched and treated each year with about 0.25 gallon of road oil or liquid asphalt per square yard. The asphalt and road oil is covered with about 15 pounds of stone chips or buckshot gravel—just enough to allow traffic to travel the roads without causing the surface to pick up. The gravel and low-type black-top roads are repaired and patched with pre-mixed bituminous materials. They are periodically sealed with liquid asphalt or tar. Then they are covered with stone chips or buckshot gravel in the amount of 1 pound of aggregate for each 0.01 gallon of sealing material applied.

Winter Work

Snow removal is not the problem in this county that it is in the northern part of the state. The snow is usually wet and heavy, and not more than once or twice each year is there any difficulty with drifting. No snow fences are used by the County. V-type snow plows are used on the Austin-Western and the Caterpillar motor graders. One-way plows are used on a 2½-ton Diamond T truck, a 2½-ton International truck, two 1½-ton Ford trucks, and a 1½-ton Chevrolet truck. These seven units comprise the snow-fighting equipment of Sangamon County, and they do the job so well that no road is impassable for long.

Although the snow does not usually remain on the roads very long at one time, there are occasions when ice makes winter driving hazardous, especially on the steeper grades. The County prepares for this condition in the autumn by stockpiling cinders near critical locations. During the winter when ice forms on the roads, county forces apply the cinders where needed.

While the snow-removal equipment is operated from the county garage, the County has 17 patrol sections for the maintenance of county roads. Each patrolman has about 10 miles of roads under his jurisdiction and care.

Repair and Maintenance

All county-owned equipment is repaired and maintained in the modern shop at Springfield. The shop is a one-story brick structure of two sections, one measuring 50 x 80 feet and the

other 60 x 80 feet. On an average, four men are employed the year round in the shop, where complete facilities are available for even major repair jobs. During dull periods in the winter, several extra men are employed in the shop, principally to clean and repaint equipment. All equipment painting is done by the County with its own force.

Funds

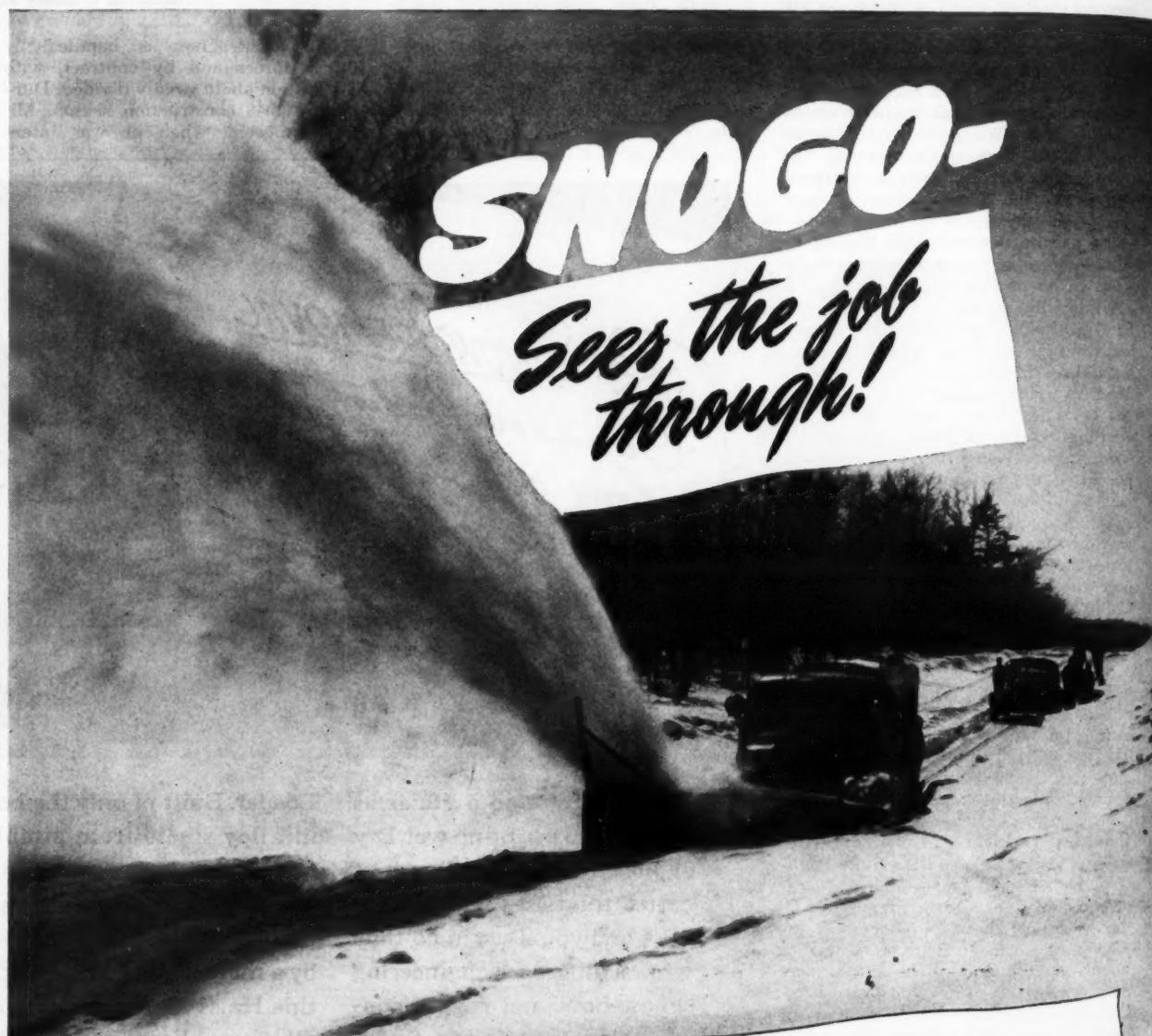
The larger portion of county funds is derived from the motor-fuel tax. One-third of this tax fund collected in the state is distributed among the various counties of the state, in proportion to the motor-vehicle license fees which the state collects from each county. The peak year was 1941 when

Sangamon County received \$243,000 from motor-fuel-tax funds and \$122,000 from other taxation and other sources. Although the war and the rationing of gasoline caused quite a reduction in the motor-fuel-tax funds received by the County, it is expected that the 1941 peak will be reached or even surpassed by 1947.

"With the increase in the cost of materials, equipment, and labor," Mr. Tilly says, "it is very evident that the County will need increased funds. The 1941 peak income may be surpassed in post-war years. But still, an increase in the local tax rate or in motor-fuel tax, or a tapping of other sources, will be inevitable if county highways are to keep pace with the motor-traffic

demand. Many farmers in this county, owning or operating several hundred acres of farm land, haven't a single horse on the farm. All their produce, which not so many years ago was transported by team and wagon, is now being transported by heavy-duty trucks. No highway without an adequate base and adequate surface can be expected to stand up under modern traffic. Much more will have to be spent on maintenance than this County now has available."

Approximately 86 per cent of all the motor-vehicle travel in the United States is done on 25 per cent of our highways and streets, it is reported in "Highway Highlights".



SNOGO-

Sees the job through!

Grinding through miles of drifts, hour after hour, is tough punishment. It takes proved equipment—equipment that has practical, field service behind it.

Check up on the Snogos in service! State after State, County after County, has used them year after year and bought them again and again on the basis of service. You don't have to baby Snogo. You can send your Snogos out and know they are going to come back leaving miles of open, safer winter road behind them.

Remember Snogo throws the snow off the road completely and leaves the ditches open to do the job they were built for. Snogo cuts away the deep side of the drift—there will be no hazardous, one-way bottlenecks with half the road open to the center line. Repeat plowing is eliminated and the cost of spring road repair due to uneven frost penetration is materially reduced.

Now is the time to plan ahead. When you are considering your requirements remember Snogo has 19 years of field service in every snow condition behind it.

KLAUER MANUFACTURING COMPANY • DUBUQUE, IOWA

SNOGO A SNOGO For EVERY BUDGET

MORE BUSINESS AND MORE JOBS!

Clear Winter Roads



The new Ateco L-HG front-end loader for mounting on a Cletrac Model HG 42 has a $\frac{1}{4}$ or $\frac{1}{2}$ -yard bucket.

New Front-End Loader Used on Small Tractor

Adaptable to a large number of construction and maintenance duties, a new front-end loader has been announced by the American Tractor Equipment Corp. The loader uses a $\frac{1}{4}$ or $\frac{1}{2}$ -yard bucket and has a high dumping clearance of 108 inches. It is built for mounting on the Cletrac HG 42 track-type tractor.

Capable of picking up, carrying, and loading many kinds of bulk material, this model L-HG loader counterbalances the weight of the bucket and lift arms with movable live weight. Two double-acting hydraulic rams powered by a front-mounted pump raise and lower the bucket. Constant power is supplied by the pump, with the tractor clutch in or out.

The loader has an overall height of 90 inches in digging position, and 60 inches in carrying position. The bucket is pivoted back of the load center to increase dumping distance. A track tie beam holds the track frame rigid and the load is evenly distributed over the tracks at all times, Ateco says.

The tractor's front end is protected by a built-in radiator guard, which serves also as an oil-expansion chamber to prevent oil overflow and loss. The entire unit, including loader, hydraulic pump, and tractor, weighs 5,250 pounds. The bucket can be interchanged with bulldozer-bowl or angle-bowl attachment.

Full details about this new loader can be secured from the American Tractor Equipment Corp., 9131 San Leandro Blvd., Oakland 3, Calif.

Brazilian Engineers Study U. S. Methods

A five-year highway-construction program, involving the expenditure of \$20,000,000, is going forward in the Brazilian state of Rio Grande do Sul. Three of the state's principal highway officials who hope to contribute to this program are on an observation tour in the United States under the auspices of the Institute of Inter-American Affairs.

Modern American methods and design in highway construction will be studied by the Brazilians during their three-month tour. Dr. Darcy Goncalves Teixeira, designing engineer of bridges and pavements in Rio Grande do Sul; Dr. Edgard Weimann Pinto, chief engineer in the fourth district; and Dr. Luis Parga Torres, chief engineer in the ninth district, comprise the delegation.

They will give special attention to highway building with highly mechanized heavy-construction equipment, since the Brazilian state plans to acquire some \$3,000,000 worth of such equipment, and to the laboratory processes and experiments involved in the design of low-cost stabilized materials and asphalt pavement. They will also study state highway administration and visit many plants which manufacture construction machinery.

Bulletin on Earth Drills

Earth drills for use in a wide variety of contracting and highway-maintenance operations are featured in a new bulletin issued by the Buda Co. Models are made for mounting on trailer, platform, or truck. Drills are available for digging small-diameter holes to 100 feet in depth, and holes of 42-inch diameter to a 10-foot depth. Copies of the brochure, Bulletin 1237, can be obtained by readers of CONTRACTORS AND ENGINEERS MONTHLY. Write the Buda Co. at Harvey, Ill., and mention this notice.

LeTourneau Staff Changes

Cloyd Richards, Assistant Service Manager for R. G. LeTourneau, has been promoted to General Service Manager. He succeeds C. F. Zimmerman, who has become the firm's sales representative in Michigan, Ohio, and Indiana following the transfer of O. A. Williams to the post of Eastern Sales Manager.



VICTOR EQUIPMENT COMPANY, 844 FOLSOM STREET, SAN FRANCISCO 7, CALIF.

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• NO SMOKE . . . NO SOOT . . . NO OPEN FIRE

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The HERMAN NELSON Self-Powered Heater cuts "Winter Waiting Time"

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Quick heat . . . lots of it . . . is yours with this portable, self-contained heating unit. Volumes of heat . . . where you want it . . . fast! Burns gasoline by a new safe method . . . requires little attention. The HERMAN NELSON Self-Powered HEATER makes you practically independent of winter cold on any construction job. Jobs go ahead faster, men are able to work better — you can fill contracts on time with this versatile heat source. Easily handled by one man.

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MOLINE, ILLINOIS



Midwest States Study Longitudinal Cracking

Find That Dummy Center Joints Which Failed to Fracture Were Largely to Blame for Cracking Of Pavements Built in Wartime

THREE states recently noticed serious longitudinal cracking in their concrete pavements. They were Kentucky, Indiana, and Illinois. The pavements in question had all been constructed during the war emergency. Was their cracking, then, caused by heavy war traffic? Or was it caused by design changes made in 1942-43 pavements because of war restrictions?

The three State Highway Departments and the Public Roads Administration embarked on a cooperative study to answer these questions. They surveyed the pavements once during the summer of 1943, when they were about nine months old. They surveyed them again during the summer of 1944. And now Earl C. Sutherland, Senior Highway Engineer of the PRA, has reported the survey findings. His article "Longitudinal Cracking in Concrete Pavements" appeared in *Public Roads*, June, 1946.

It reports that wartime design changes, more than traffic loads, were responsible. True, the cracking pavements in Kentucky were near Fort Knox and were subjected to heavy tanks and trucks. And although those in Indiana and Illinois were not traveled by tanks, a large percentage of their traffic was commercial, and much of it was overloaded. However, the investigators studied several older pavements of standard design which had survived the same traffic with little or no longitudinal cracking. So they assessed heavy war traffic as a contributing but not a primary cause.

Design Changes—Results

Specifically what design changes were to blame, then? And first, what changes were made in 1942-43? There was no change made in specifications for aggregates. There was no change in concrete mixing or placing procedures. The strengths of the concrete were normal as determined by control specimens. No part of the pavements was opened prematurely to traffic. There was nothing unusual about the soil or the pavement subgrade. There was no fault in surface drainage. But two important changes were made: (1) none of the pavements contained distributed reinforcement or load-transfer devices, and (2) all used the dummy center joint.

The investigators found in this latter change the potential flaw. Their main conclusion was as follows: longitudinal cracking occurs when the dummy center joint has been slow to fracture.

They found cracking coupled with slow joint fracture over and over again. For instance, in their 1943 survey of Kentucky pavements, all but one or two of the longitudinal cracks were in pavement panels where the dummy joint had not fractured, and therefore was not functioning as a longitudinal joint. In the 1944 survey of one Indiana road, all of the panels in which the center joint had not fractured contained longitudinal cracks. Only in Illinois were there many panels in which the joint had not fractured but in which there was still very little cracking. The greater depth of Illinois pavements seemed to be the answer; it delayed joint fracture, and also resultant cracking.

Conclusions

The conclusions Mr. Sutherland reports can be listed as follows:

1. There is a definite tendency towards longitudinal cracking when the

dummy center joint is used.

2. This is borne out by the fact that older pavements also constructed with dummy joints showed a tendency to the same cracking. However, their pre-war reinforcement kept it from being severe.

3. Heavy war traffic may have increased this tendency.

4. But lack of reinforcement in the pavements more probably caused the seriousness and speed of the cracking.

5. The dummy joint is slower to fracture when pavements are laid late in the year; therefore pavements laid late in the year show greater cracking.

The investigators' explanation of the cracking, which Mr. Sutherland reports,

involves the question of slab stresses:

1. Heavy wheel loads produce high tensile stress. The highest is found directly under the wheels. Since a vehicle's normal position is in one lane, the stress would cause cracking there and not at the center line.

2. However, in a pavement slab that has not broken along the center line, restrained temperature warping also causes a transverse tensile stress. This reaches its maximum value at the center line of the pavement where it causes much cracking. It also extends out to each side and may combine with wheel-load stresses to cause cracking there.

3. Partition of the slab along the center line reduces these temperature

warping stresses, and also combined warping and wheel-load stresses.

The remedy proposed by the investigators is a matter of design. The 1942 pavements in the three states had a ribbon separation nearly one-third of the pavement depth. The fact that these joints did not fracture as was intended indicates that a groove of this depth is not adequate. If a weakened-plane center joint is to be used, it should be modified in some way to give prompt fracture. Increasing the depth of the center groove might be helpful. But the most logical remedy for the cracking, the investigators maintain, is the use of a longitudinal joint that has definite separation at the time of construction.

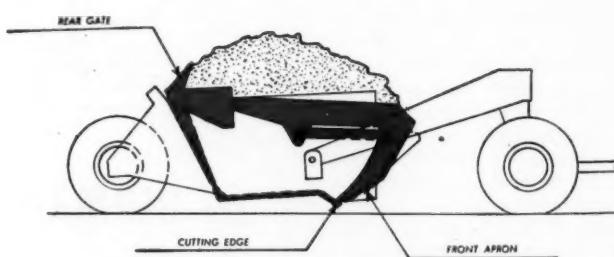
FASTER . . .

**... EASIER
CLEANER . . .**

Dump

Regardless of the kind of material you have to load, you can always be sure that it will be dumped positively and cleanly on every trip with a LaPlant-Choate "Carrimor." This is because the rear gate of the "Carrimor" not only bulldozes all material out of the bowl but the front apron moves ahead and out of the way at the same time. So there's no chance of jamming or sticking . . . no lost time or broken cables trying to get rid of that "last yard." With a "Carrimor" the full load is dumped quickly and easily and the rear gate is positively returned the full distance, ready for the next trip.

Moreover, these new LaPlant-Choate scrapers in 8- and 14-yard capacities will carry a uniform spread at consistently higher tractor speeds because the cutting edge is positively controlled and completely independent of other moving elements. Add to these advantages superior "loadability," "grade-ability" and low horsepower requirements and you'll see why so many agree on LPC for lowest possible cost per yard. See your LaPlant-Choate "Caterpillar" distributor, or write: LaPlant-Choate Manufacturing Company, Inc., Cedar Rapids, Iowa; 1022 77th Ave., Oakland, California.



Here is an LPC "Carrimor" shown with a full heaped load, ready for dumping. Thanks to a newly designed cable arrangement, the cutting edge can now be lowered to any desired spreading depth and positively locked to insure a smooth, even spread, without further manipulation of the power control unit.

LaPLANT
Job-Proved Equipment

Access Roads to Open Up Timber Lands; Aid Housing

The road builders of America are going to help build homes for our veterans, Charles M. Upham, Engineer-Director of the American Road Builders' Association says in a recent announcement. This doesn't mean, however, that they are going to forsake road building for general contracting.

To reach lumber in the national forests and on Indian reservations, the highway builders will be asked to build or rebuild over 2,000 miles of access roads, Mr. Upham reveals. The program is being initiated to obtain additional millions of board feet badly needed

for housing.

Funds for the construction are made available under the Veterans' Emergency Housing Act, supplementing regular Forest Service appropriations. The roads, of the heavy-duty type for year-round logging, will be built by the Forest Service and the Public Roads Administration by contract and by force account.

All told, 213 national-forest projects will be carried out in 31 states to provide 1,417.6 miles of new roads and 490.6 miles of improvements. Eight projects, totaling 222 miles, will penetrate the Indian lands. The heaviest mileage, naturally, is in the western states.

Aiding this program of lumber-access roads, the California Division of Highways is collaborating with the PRA to build a 35-mile stretch on Trinity Highway. Costing \$350,000, the project will connect Arcata on Humboldt Bay with Willow Creek on the crest.

A Correction

The equipment dealer mentioned on page 61 of our August issue should have been designated as the Nesbitt Equipment Co. of Washington, D. C. The company also has offices in Salisbury, Md., and Wilmington, Del., and plans one in Richmond, Va. It is exclusive distributor for Master Vibrator.

Hazard Removed By New Alignment

(Continued from page 1)

On the existing concrete road, the transition from a 47 to a 25-foot pavement on an 8-degree curve occurred all at once. The recent project changed this to a gradual tapering of the reduced width over 1,200 feet of roadway on 2-degree curves separated by a 300-foot tangent. At the south end of the project, near York Corner, the existing 8-inch concrete pavement was divided into five construction lanes, four traffic lanes, with a total width of 47 feet which converged into three lanes, two 8 feet wide and one 9 feet wide. This concrete pavement was removed for 1,700 feet and replaced with bituminous macadam, which is 25 feet wide with the exception of the 1,200 feet of transition. The balance of the old pavement was covered by fill. Two houses had to be removed from the new right-of-way in order to make room for laying out the flat curve.

Although short in length, the job was not easy to build. Some very hard granite rock was encountered in ledges on the new location; it necessitated the replacement of bits on the rock-drilling equipment every few inches. The biggest problem and headache, however, was the heavy traffic rolling along U. S. 1, bringing vacationists in and out of the Pine Tree State. This was so intense that the contractor soon discovered Saturday work was out of the question with the road full of automobiles over the weekend. Two-way traffic was maintained over all but one-third of the project where conditions were so tight that one-way movement had to be enforced.

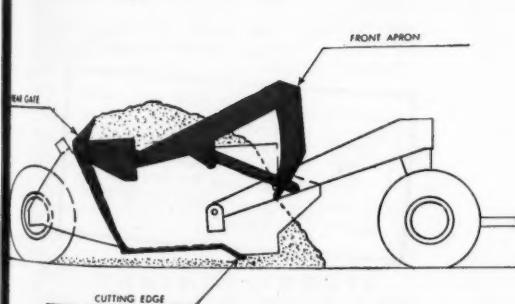
A Borrow Job

To remove the 4,200 cubic yards of rock which was encountered, two Ingersoll-Rand wagon drills and six Ingersoll-Rand Jackhammers were used for drilling; air was supplied by two 315-cfm compressors, an Ingersoll-Rand and a Worthington. In some places the rock had to be drilled to a depth of from 12 to 14 feet. The deep drilling was done by the wagon drills using 1½-inch drill steel starting with 4-foot lengths and increasing in multiples of 2 up to 14 feet. Bits started with 2½-inch size and decreased by ½'s to 2¼-inch diameter. Holes were placed on 6-foot centers in both directions and filled with 2½ to 3 pounds of American 40 per cent dynamite to a hole. With the use of Primacord, up to 300 holes were blasted at a time, taking off the full lift. This method interfered less with traffic than would a series of smaller blasts. A Bucyrus-Erie 34-B 1½-yard shovel loaded the excavation, earth and rock, to a fleet of three Sterling 6-yard and two Ford 4-yard trucks which made an average ¼-mile haul over the job.

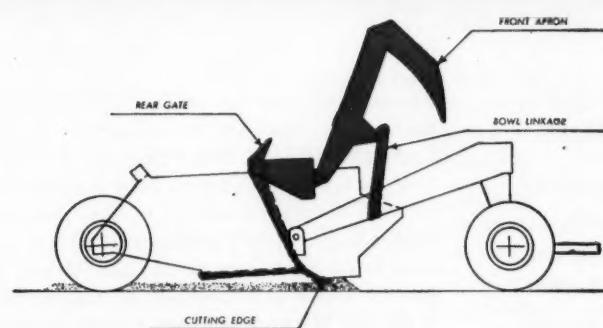
The same shovel also removed the concrete pavement after an opening was blasted in it by inserting a couple of pounds of dynamite in four drill holes. The 8-inch slab broke up into approximately 10-foot-square sections as the shovel worked from below lifting the concrete from the ground. An International TD-18 tractor-dozer pushed the old rubble off the roadway on to the fills; in some cases, though, people along the road found use for the material to fill in low areas on their property.

Not enough earth was available from the cuts to make the embankment fills, so about 3,000 yards of material was excavated from a pit which was opened about ½ mile west of the center of the job. The shovel and trucks were used in digging and hauling the material.

(Concluded on next page)



This sketch shows you the generous initial opening of the front apron, which allows the material in the front of the bowl to spill out by gravity before the rear gate starts forward. Note how the front apron moves ahead as it travels up, thus assuring an absolutely free exit of material.



Here you see an LPC "Carrimor" in full dumping position, showing how LaPlant-Choate's patented linkage arrangement functions in emptying the scraper bowl completely, without any chance of jamming sticky or bulky material between the rear gate and front apron—an exclusive LaPlant-Choate feature!

CHOATE
Equipment... for Lowest Possible Cost in Moving Earth



Hazard Removed By New Alignment

(Continued from preceding page)

Drainage consisted chiefly of re-laying some 18-inch and 21-inch cast-iron pipe.

Sub-Base and Pavement

As a foundation for the macadam pavement, nearly 5,000 yards of gravel was spread the length and width of the roadway in three 6-inch courses. The gravel was secured from a pit south of the job, necessitating a 6-mile haul with the same equipment used in obtaining the borrow. The courses were spread by a Caterpillar No. 10 power grader and rolled by a Buffalo-Springfield 13-ton 3-wheel roller.

On top of the gravel was laid a stone base course 5 inches thick. This was spread in two layers by the grader with each course rolled separately. The stone is 2 to 3 inches in size and was purchased from the Blue Rock Quarry at

Westbrook, Maine, and delivered to the job after a 40-mile haul. After the top layer was laid, the stone was choked with sand in order to fill all the voids. About 400 yards of sand was required for this purpose; the excess was swept from the stone by a Littleford power broom.

The stone base was then covered with a 3-inch layer of top stone, 2-inch down to $\frac{3}{4}$ -inch in size, secured from the same quarry and spread and rolled as was the base course. After this was in place, the Eastern Tractor & Equipment Co. of Portland used one of its distributors to spray two applications of emulsified asphalt for a total of 1.75 gallons to the square yard of bitumen over the top stone. Each application was then covered with a light layer of stone chips, $\frac{3}{4}$ -inch down in size, spread by a Burch Chip-It-Over spreader pushed along at the rear of a truck. A few days intervened between the asphalt applications to permit curing, after which a seal coat was applied. This consisted of 0.6 gallon of emulsified asphalt in

two applications, each followed by a cover coat of $\frac{1}{4}$ to $\frac{1}{2}$ -inch stone chips. The asphalt was shipped 30 miles from Portland to a siding of the B & M railroad at Wells, where it was pumped from the tank car by the distributor and hauled 15 miles to the project. The bitumen was applied at a temperature of 98 to 110 degrees F.

Quantities and Personnel

The final seal coat was finished in the latter part of August and the new road was opened to traffic for its full width, which is a minimum of 25 feet with 4-foot shoulders. The major items included:

Earth excavation	2,000 cu. yds.
Rock excavation	4,200 cu. yds.
Removal of old concrete	4,800 sq. yds.
Borrow	3,000 cu. yds.
Gravel	4,800 cu. yds.
Crushed stone	1,900 cu. yds.
Emulsified asphalt	21,700 gals.

The Bridge Construction Corp. employed an average working force of 20 men under the direction of O. M. Taylor, Superintendent, and Vernon E.

Davis, Assistant Superintendent. W. B. Horsman was Engineer in charge for the Maine State Highway Commission which is headed by Lucius D. Barrows, Chief Engineer.

Roto Wing Co. Moves

The Roto Wing Co., maker of rotary snow plows, has moved its factory and offices from Mound to Shakopee, Minn.

**SO EASY
TO APPLY..**
it almost runs itself!



NEW EXTRUDED COATING
improves application and
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STOODY SELF-HARDENING*

*For HARDFACING all wearing equipment
where Impact and Abrasion are involved.

FROM ALL OVER THE NATION come enthusiastic reports on ease and speed of applying the new Extrusion COATED STOODY SELF-HARDENING! This harder, more uniform coating brings improved welding performance: Slashes welding time, assures dense deposits, minimizes porosity!

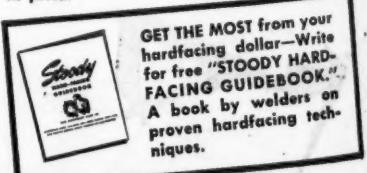
NO MORE TEDIOUS SCALING—where multiple passes are required, slag is easily removed while deposits are still hot—is SELF-LIFTING as deposits cool!

AC-DC APPLICATION—use either type machine. Amperage adjustment isn't fussy... good arc characteristics over a wide range! Can be deposited in any bead type or welded in any position.

NO CHANGE IN PHYSICAL CHARACTERISTICS—you get the same high wear resistance, same hardness—even on multiple passes!

GIVE THE NEW COATED STOODY SELF-HARDENING A WHIRL. You'll like the way it handles, you'll grin with satisfaction at results... for it's the same wear resistant metal that's won and held its place on merit for 20 years... now improved for easier, faster welding.

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3/8 to 30 Cubic Yds.

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DRAGLINE
BUCKETS

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You automatically step up the YARDAGE of your dragline by hooking up a Hendrix Lightweight Bucket! It's 20% to 40% lighter than other buckets, type for type! Can be used on a machine designed for small operations and still maintain the allowable loaded weight. You'll get bigger payloads on operations requiring a long boom, and in wet digging you'll increase your payloads by leaving the water in the pit. We took the load out of the bucket... to let you put it inside!

- ★ 20% to 40% lighter than other buckets, type for type.
- ★ All welded construction for greater strength and durability.
- ★ Manganese Steel chains, fittings, and reversible tooth points.
- ★ Full Pay Load every trip, even in wet diggings.
- ★ Perfect Balance, handles easier, fills faster, dumps cleaner.
- ★ Three Types; light, medium, and heavy duty. With or without perforations.

New Girder Bridge Replaces Wood Span

Concrete Abutments and Piers Support 402-Foot 3-Span Structure; Road Relocated for Approaches

THE latter part of this summer saw completed a 402-foot 3-span continuous deck-plate-girder bridge to carry State Route 16 over the Saco River, $\frac{3}{4}$ mile north of Conway, N. H. This modern structure is supported on concrete abutments and two river piers. It was built for the New Hampshire State Highway Department by the Engineering Service & Construction Co. of Boston, Mass., which was low among ten contractors with a bid of \$157,976.03. The high bid was \$202,004. Designed for H-15 loading, the new bridge has a reinforced-concrete-slab deck with a 28-foot clear roadway. As part of the contract, State Route 16, better known as White Mountain Highway, has been relocated, requiring long approaches of 3,000 feet on the east end and 1,200 feet on the west. The new bridge crosses the 300-foot-wide river on an east-west bearing. It lies about 400 feet south of the old, narrow, covered wooden bridge of 1890 vintage which it replaces.

Work started in June, 1945, with the awarding of a subcontract to Thomas L. Watkins & Son of Amesbury, Mass., to grade the 4,200 feet of approaches and to construct the necessary drainage structures. By completing the approach fills by autumn, sufficient time was given for settlement over the winter; then a tar surface-treated pavement was laid this spring, thereby insuring a smoother and more lasting surface.

Approach Fills

The subcontractor began operations by stripping topsoil from the roadway limits to a depth of 8 inches over the entire right-of-way with a dozer blade on a Caterpillar D7 tractor. The material was stockpiled outside the working area of the approaches for use later as loam for dressing the fill slopes. In grading the approaches, 23,100 cubic yards of excavation was required, along with 10,500 cubic yards of borrow material. Most of the borrow was used on the west approach, since the east side provided a good source of material in a roadway cut about 800 feet long with a maximum depth of 15 feet. On the west side a borrow pit only $\frac{3}{4}$ mile from the site provided the necessary dirt. In general, the soil in this region is of a gravelly nature. It makes excellent fills, and is also not too difficult to dig.

Two shovels were used for excavating, a Link-Belt Speeder 1 $\frac{3}{4}$ -yard and a Lorain 1 $\frac{1}{4}$ -yard. These loaded eight Sterling 5-yard trucks used for the hauls. The larger shovel worked the east approach cut, while the smaller unit was used in the borrow pit on the west side of the river. Later, when the earth work was completed, arrangements were made between the prime contractor and subcontractor to have the shovels dig the abutment excavations on either river bank. The approach fills averaged about 16 feet high above the original ground. They were compacted in 1 $\frac{1}{2}$ to 2-foot layers by the D7 tractor and shaped by a Galion power grader.

Concrete Abutments

The material removed for the abutment excavation consisted of loam, sand, gravel, and clay, interspersed with several large boulders which had to be broken before the shovels could handle them. Holes were drilled about

halfway into each boulder by an Ingersoll-Rand Jackhamer using 4-foot lengths of 1-inch steel with 1 $\frac{1}{2}$ -inch detachable bits. Power for the tool came from a Worthington 220-cfm compressor mounted on a GMC truck. From 2 to 2 $\frac{1}{2}$ sticks of du Pont 60 per cent dynamite were then used to blast the boulder into pieces small enough for shovel handling.

The excavation was completed to elevation 80, the bottom of the footing. Then a 50-foot boom was put on the Link-Belt Speeder unit for driving creosoted-wood piles as a foundation for the concrete abutments. Using a McKiernan-Terry No. 7 hammer powered by steam from a 35-hp coal-burning vertical-type boiler, the crane drove 65 piles for each abutment: 45

under the main structure and 10 under each of the two wings. The piles had 8-inch tips and 12-inch butts. They were 35 feet long under the east footing but only 25 feet on the west side. Test borings indicated that the stratum of foundation bearing material is higher on the west than on the east bank of the river; this accounted for the difference in pile lengths. All piles, however, were driven to 18-ton bearing

capacity on a foundation of heavy coarse gravel which, over the centuries, had been deposited by the river and compacted thoroughly on its banks. During the final driving blows of the hammer, very little penetration resulted.

Footings for the cantilever-type abutments are 38 feet long x 15 feet wide x 4 feet deep. The wing footings

(Continued on next page)

There's Always a BEST WAY

That goes for snow clearance, too. It's no mere accident that DAVENPORT-FRINK SNO-PLOWS

enjoy engineer-preference throughout the snow belt. They have won their spurs through Faster • Safer • Cleaner Snow Removal.

ACT PROMPTLY

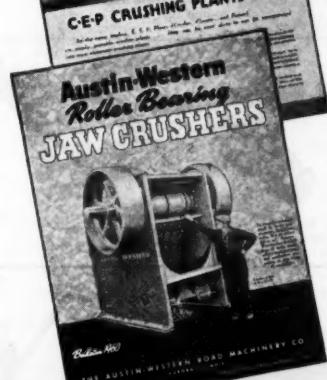
We'll be glad to give you complete information—the sooner the better, because, frankly, there'll be a waiting list. The early bird will get the Sno-Plow—and repair parts—unless steel starts coming through at a much faster pace.

DAVENPORT BESLER CORP.

Dept. A

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PORTABLE CRUSHING and SCREENING PLANTS

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BULLETIN 1997

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• The Post-War demand for crushed aggregate for highway and all other forms of construction is already tremendous and growing day by day. Austin-Western is ready with a full line of job-tested equipment, including:

Jaw Crushers and Roll Crushers in a wide range of sizes; plus matching screens, elevators, conveyors and bins.

Portable Crushing Plants, from the smallest to the magnificent Two-Unit and Three-Unit Plants which combine maximum output and variety of specification on the one hand, and maximum economy of operation on the other; giving the owner flexibility of operation that spells maximum profits.

Your nearby Austin-Western dealer will be glad to recommend the plant best suited to your needs.

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BUILDERS OF

ROAD MACHINERY

Austin Western

SINCE

1859

New Girder Bridge Replaces Wood Span

(Continued from preceding page)

are also 4 feet deep, but they are 14 feet 5 inches long x 12 feet wide. The front of the 2-foot 3-inch abutment wall is set back 4 feet from the toe of the footing; the wall itself is nearly 20 feet high. Because of the requirements to vibrate the concrete, extra care was taken to see that the formwork was of sturdy material and of sound construction. Throughout the work, 1 x 6-inch boards with square edges were used, and for all exposed surfaces the boards were lined with plywood. The studs were 2 x 6's on 16-inch centers, backed by double 2 x 6 wales on 3-foot centers secured in place by Richmond screw anchors. Form lumber was purchased from local mills. It was cut by the contractor to the required lengths by an American bench saw having a 12-inch circular blade.

Pouring Concrete

For pouring operations the concrete plant was set up directly behind each abutment. The cement and aggregate were placed around the Koehring Danie 10-S 2-bag mixer, which was supplied with water from the river by a Domestic 1½-inch pump. Dragon bag cement was shipped from Thomaston, Maine, in freight cars over the Maine Central railroad to a siding at Redstone, N. H. From there it was hauled the remaining 4 miles to the job site by truck. Sand was obtained from a pit at Intervale, N. H., where it was loaded by hand into four Ford and Chevrolet 1½-ton trucks. These were rented by the hour and hauled the material 5 miles to the bridge. The coarse aggregate, washed gravel, came from the Maine Sand & Gravel Co. at Lewiston, Maine. It was shipped in hopper-bottom cars via the Maine Central railroad to a siding where it was unloaded by a belt conveyor, 26 feet long x 2 feet wide, into the trucks which hauled it to the job site.

The contractor's chief problem on this bridge construction was not materials, but men to move the ingredients to the mixer and then to get the concrete to the forms. He tried to hold an average of 18 men on the job, including 2 equipment operators, 6 carpenters, and 10 laborers, and increase this number on the days when concrete was poured. The personnel varied considerably in number, however, so that it was impossible to mix and place more than 60 cubic yards of concrete in any one day. The sand and gravel were shoveled by hand into three Jackson rubber-tired wheelbarrows and weighed on a Johnson Little Titan scale before being dumped into the mixer skip. The weight of a 2-bag batch composed of 1 wheelbarrow of sand and 3 of gravel was as follows:

Cement	188 lbs.
Sand	280 lbs.
Gravel	555 lbs.

After being mixed for one minute the concrete was dumped into four buggies and wheeled over a wooden runway for depositing into the forms. There it was vibrated by a Master vibrator. As the forms went up higher, the use of buggies and chutes became impractical. So the concrete was then dumped from the mixer drum into a Stuebner 1-yard controllable bottom-dump concrete bucket which was lifted to the forms by the crane. The east and west abutments were poured in that order. The bridge seat of the abutments on which the steel girders rest is at elevation 92.33, while the wall itself is carried up to elevation 103.94. However, in order to facilitate the erection of the steel, the full wall pour was stopped 2 feet short of the finished

grade and was completed after the girders were set in place. This insured a smooth joint where the concrete and steel meet at the end dam of the abutment wall.

Sheet-Pile Cofferdam

The Saco River is fairly shallow along the banks but has a 10-foot depth at the center. It was possible, however, to build cribbing out from each bank over which men, material, and equipment moved for the construction of the two river piers. The total 402-foot bridge length, center to center of end bearings, is divided into three spans, 120, 162, and 120 feet each. But as the abutments were set back some distance from the river bank, only about 40 feet of cribbing was required on each side to reach the location of the piers. Work was started on the east pier first where the water was from 2 to 4 feet deep, flowing over a river bed of coarse sand.

Six 12-inch logs were laid closely

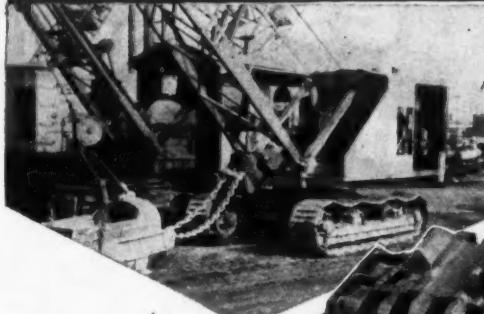
together out into the river to form the foundation for the cribbing. They were held in place by other 12-inch logs placed 4 feet apart crosswise of the long members. The logs were secured by long spikes and the cribbing was filled with fairly large stones as an anchorage. Where the water was shallow close to the bank, the cribbing was filled with sand and gravel. This made a stable 12-foot roadway out in the stream. Farther out where the water was deeper, there was danger of the sand and gravel being washed away. So a latticework of 2 x 6's was nailed on top of the logs, and on this cleated surface the crane used in pile driving took up its position.

The cofferdam for the pier was constructed of steel sheet piling, 22 feet long x 19 inches wide. It was driven by a McKiernan-Terry No. 7 steam hammer swung from the 50-foot boom of a Lorain 75 crane. This equipment was rented from Alvin J. Coleman, a Conway, N. H., contractor, for the other

two units were the property of the subcontractor and had been moved away when he finished his part of the work. Under the piers in the river bed is a combination of sand and gravel, and the test borings showed excellent foundation material at elevation 57.5 at the east pier. During the pile driving, however, an extremely tough stratum of clay and stony hardpan was encountered at elevation 60.25. So it was decided to set the footing on this material at elevation 60.0. This involved changing some of the rounded wood, prefabricated forms for the pier nose, re-dimensioning the pier itself, and partially revamping the reinforcing steel. These changes were offset, however, by a saving in the amount of difficult excavation and in the quantity of concrete used, while the subfoundation material was as desirable at the higher level as it was at the lower elevation.

Driving the sheet piling through the

(Continued on next page)



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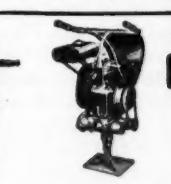
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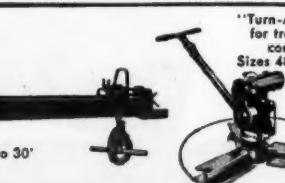
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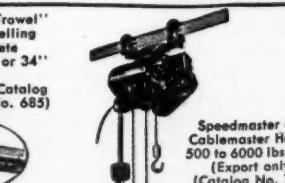
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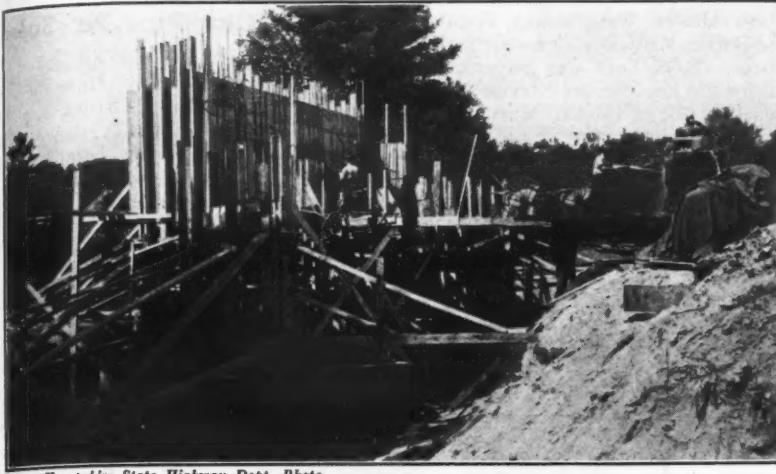


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DAYTON 1, OHIO





New Hampshire State Highway Dept. Photo
A new 402-foot 3-span bridge, shown here under construction, was recently completed to carry State Route 16 over the Saco River in New Hampshire.

New Girder Bridge Replaces Wood Span

(Continued from preceding page)

upper 3 to 4 feet of penetration was fairly easy, but below that point the heavy coarse gravel made jetting a necessity. Accordingly a Worthington 10 x 10 x 6 steam-driven jet pump with a 5-inch intake was set up on the bank of the river, with a 2-inch iron discharge pipe running over to the crib walk. From here the discharge line was carried out to the hammer through a 2-inch rubber hose with a $\frac{1}{4}$ -inch nozzle at the jet. Working at 200-pound pressure, the jet pump was run for 2 or 3 minutes before the hammer started operating so as to clear away the fines. This made it easier for the hammer-driven pile to crowd the coarse material out of the way and effect a penetration. The jetting continued for the length of the driving, until the stratum of hardpan was reached. Immediately above that, a 6-inch layer of clay sand with the qualities of rock dust was removed by means of the jet.

Building the Piers

A $\frac{1}{2}$ -yard clamshell bucket was then attached to the crane boom and the excavation of the cofferdam proceeded in alternate operations with the pile driving. The material removed was dumped around the outside edge of the cofferdam, helping to effect a seal, while the unwatering was done by a pair of Gorman-Rupp 6-inch pumps driven by Hercules engines and a Novo 3-inch pump.

When the 34 x 16-foot cofferdam was dry enough to work in, form work for the pier footings got under way. The footings measure 30 x 12 feet with the west footing 4 feet deep and the east footing $4\frac{1}{2}$ feet deep. The cofferdams were well braced with timber 6 x 8's, the lowest ring being 2 feet above the bottom of the excavation, followed by another ring $3\frac{1}{2}$ feet higher, with the top ring 4 feet above that. The slanting inward pressure of the sheeting kept the lower ring from slipping to the bottom. The other rings were held in place by support from 6 x 8 legs placed between the rings, five legs to each side and one in the center at the ends. Each ring was cross-braced with five other 6 x 8's, two outside the pier forms and three going through the forms which were built in the same manner as were the abutment forms.

During the footing pour the lower bracing had to be removed, and the upper bracing also had to be changed while the piers were being constructed. To keep such shifting of bracing to a minimum, the first pour in the main barrel of the pier was held to 6 feet 8 inches. Further bracing was removed as the piers rose to their full height of 26 feet $2\frac{1}{2}$ inches from the top of the

At the west pier the Saco River was about 9 feet deeper, but the construction operations were the same after a deeper and sturdier cribbing walk was laid out in the stream. Concreting methods were the same as those used in the abutment pours. The sheet piling was then removed by a pile extractor and the substructure was ready for the erection of the structural steel.

Bridge Superstructure

In the early months of 1946 the American Bridge Co. erected the steel superstructure. This consists of two girders spaced 17 feet on centers, and having a depth of $7\frac{1}{2}$ feet at the abutments, 11 feet at the piers, $5\frac{1}{2}$ feet at the center of each 120-foot span, and 6 feet at the center of the middle 162-foot span. The girders are laterally cross-braced with structural angles and have web thicknesses of $\frac{7}{16}$ to $\frac{11}{16}$ inch. Rivets are $\frac{1}{8}$ inch in diameter in $\frac{1}{8}$ -inch holes.

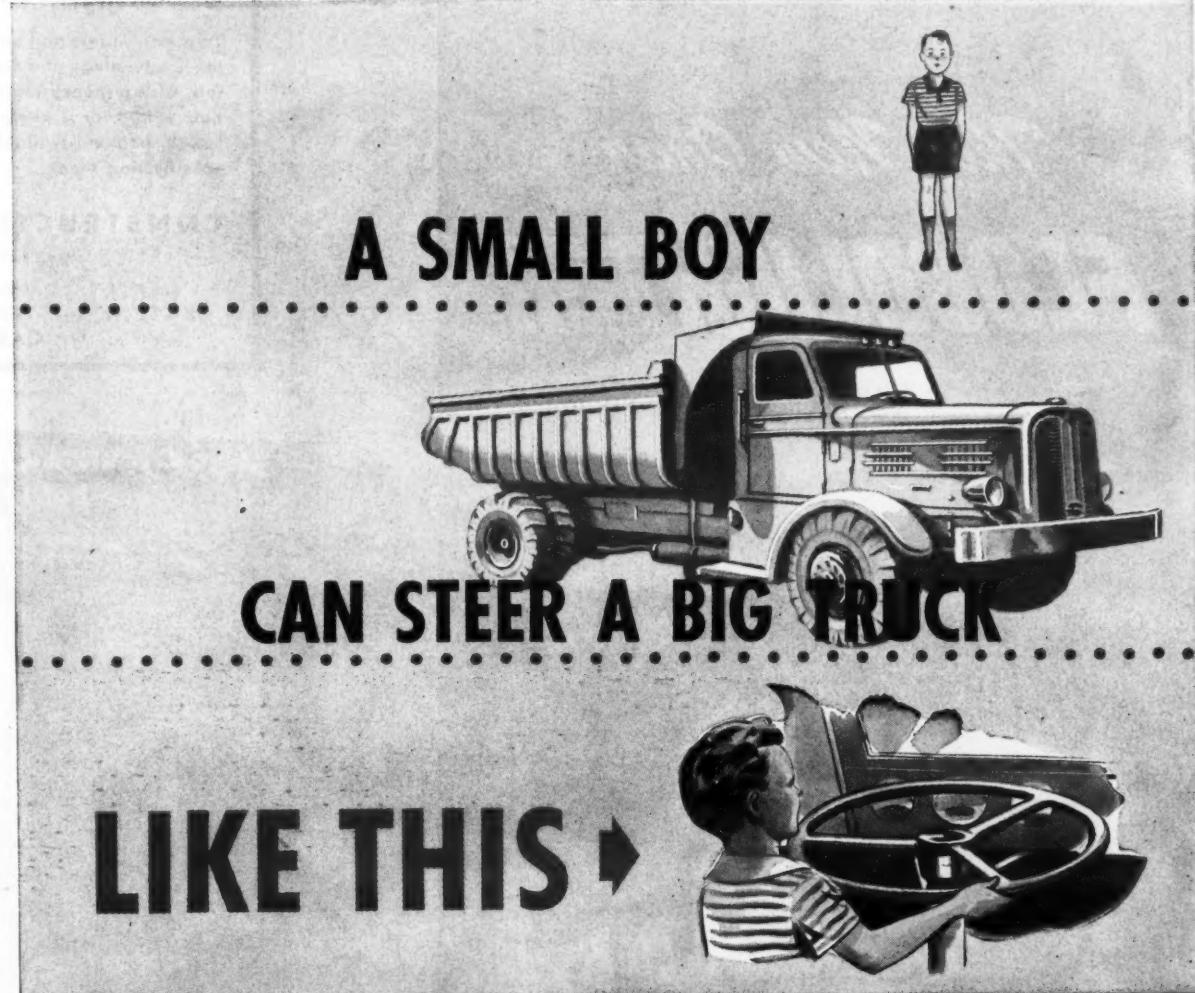
Across the tops of the girders are the 18-inch wide-flange 47-pound floor

beams on 6-foot centers. These support the reinforced-concrete roadway slab, $7\frac{1}{2}$ inches thick at the curbs and $8\frac{1}{4}$ inches at the center. At each side of the roadway is a 6 x 10-inch granite curb and a 2-foot $8\frac{1}{2}$ -inch sidewalk protected by an outside pipe rail 2 feet 10 inches high.

Paving the Approaches

In the autumn of 1945 when the grading of the approaches was finished, an 18-inch gravel base course was laid through all cuts while a 12-inch course was put on top of the fill sections. On top of this base course went a 4-inch gravel surface course. All the gravel was taken from the same pit. But in order to prevent large pieces of metal from getting into the surface course, a large 3-inch screen was placed over the body of a truck when a shovel was loading it with surface-course material. In this way the bigger pieces of gravel were screened out. Attached to the screen were two pieces of cable

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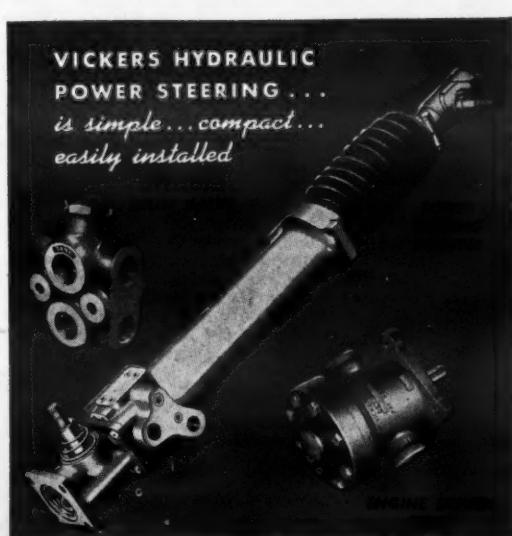
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We don't expect a small boy to drive a big truck or bus, but his strength is many times equal to the steering effort required if the vehicle has Vickers Hydraulic Power Steering. The steering wheel turns with effortless ease, and the front wheels always follow exactly.

Moreover, no matter how rough the ground, no road shock can get to the driver. The steering wheel cannot spin, or jerk—the vehicle can be driven over the curb or through sand with no "fight" from the wheel. A flat tire will not cause swerving. The driver is relieved of the most fatiguing part of his job—enabling him to work faster and longer with greater safety.

Vickers Hydraulic Power Steering is simple, compact, easy to apply to existing chassis designs. It has automatic protection against abuse and excessive steering reaction forces. Lubrication is automatic. Fifteen years of successful operating experience on trucks, buses, road machinery, etc. have proved the value of Vickers Hydraulic Power Steering. Write for Bulletin 44-30.

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New Girder Bridge Replaces Wood Span

(Continued from preceding page)

joined by a ring which was slipped over the shovel dipper, so that the whole unit was easily lifted into place and later removed by the shovel at the pit.

This spring, when the ground settlement had stopped, a prime coat of 0.5 gallon to the square yard of tar was applied to the gravel surface, resulting in a penetration of from $\frac{1}{2}$ to $\frac{3}{4}$ inch. The following day a lighter seal coat, 0.25 gallon of tar to the square yard, was applied and covered with a blotter of sand, making a bituminous mat about $\frac{3}{4}$ inch thick. This surfacing was part of the subcontract of Thomas L. Watkins & Son.

The old, covered, wooden span will not be torn down at the completion of the new bridge. It will be left in place for the town to use. This old structure has two spans with a single river pier

for a total length of 225 feet 6 inches. Its outside width is 30 feet with a clear roadway of 18 feet $\frac{9}{16}$ inches and a sidewalk on each side; the vertical clearance is 24 feet above the river. It was built in 1890 for the Town of Conway by Charles Broughton and his son Frank, both of Conway, at a cost of \$4,000, and was the third bridge to be built at that site. At present this lattice-truss structure has a single H-4 load capacity.

Items and Personnel

The major items taken from the estimate of this contract included:

Roadway excavation	23,100 cu. yds.
Earth borrow	10,500 cu. yds.
Concrete	1,177 cu. yds.
Reinforcing steel	105,731 lbs.
Structural steel	616,000 lbs.
Treated-timber bearing piles	3,510 lin. ft.

Nat. S. Stevens was Resident Engineer for the New Hampshire State Highway Department which is headed by Frederic E. Everett, Commissioner. D. H. Dickinson is Chief Engineer; H. E. Langley, Bridge Engineer; F. M.

Auer, Bridge Supervising Engineer; and Robert Whitaker, Construction Engineer. Basil Zolli was Superintendent for the Engineering Service & Construction Co. of Boston, Mass.

Make safety more than a slogan on your job. Safety Always Pays!

Directs Clay-Pipe Pa. Sales

Richard C. Haury has succeeded J. M. Riordan as Resident Manager for The Robinson Clay Product Co. at Philadelphia, Pa. He has served the clay-pipe-manufacturing company at Akron, Ohio, for 15 years.

This New Onan FLOODLIGHTER



NIGHT OPERATIONS are easier, faster, safer... with the mobile Onan Floodlighter. Special dolly mounting permits quick hitching and high-speed towing. On location, the Floodlighter is easily moved, operated and serviced by one man.

Three 1000-watt lamps, enclosed in spun aluminum reflectors, provide brilliant illumination for airport runways, loading ramps, aprons, outdoor depots and construction sites.

Rugged, weatherproof, sheet-steel housing protects the 3000-watt A.C. power plant. The prime mover is an Onan air-cooled gasoline engine direct connected to the generator for maximum compactness and permanent alignment. Quick and sure push-button electric starting.

Motor-driven tools and auxiliary lights plug-in directly at the four outlets mounted on a recessed panel.

Standard Equipment

FLOODLIGHTS: Three; height adjustable to $8\frac{1}{2}$ feet; 360 degree horizontal arc; wide vertical arc.

ENGINE: Onan 2-cylinder, 4-cycle, air-cooled.

GENERATOR: 4-pole, self-excited, inherently regulated.

DOLLY MOUNTING: Two ball-bearing steel-disc wheels; 6 x 15, four-ply pneumatic tires; ball trailer hitch; deadaxles.

STARTING: Electric push-button; batteries supplied.

ONAN Electric Plants are available in many sizes and models.

ALTERNATING CURRENT: 350 to 35,000 watts in all standard voltages and frequencies.

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BATTERY CHARGERS: 500 to 3,500 watts; 6,12,24 and 32 volts.

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MORE AND MORE JOBS

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SMOOTHER SURFACES—surface variations as much as 50% lower!

FASTER—fewer trips do the job—users claim one 3-axle tandem is the equivalent of two other rollers!

GREATER COMPACTION—surface densities appreciably higher than with lighter rollers.

Remember, Buffalo-Springfield makes the only true 3-axle tandem with two equally large diameter steerable guide rolls. Ask for literature.



The Oldest and Largest Builder of
Road Rolling Equipment in America



This new 27.00-33 earth-mover tire, largest ever made by the Goodyear Tire & Rubber Co., has recently been added to the firm's regular line for use on off-the-road hauling units.

Goodyear's Biggest Tire an Earth Mover

Weighing 1,482 pounds, an earth-mover casing recently put into production by The Goodyear Tire & Rubber Co., Akron, Ohio, is the largest truck tire ever built by the firm. The 27.00-33 size has been added to the firm's regular sales line.

The tire uses 24-ply heavy-gage rayon in its construction, and is designed to handle unusually heavy off-the-road hauling. It has a load rating of 31,050 pounds at 40-pound inflation when going 10 mph. At a 25-mph speed its load rating is 27,600 pounds.

Two tread designs are being used in the new tire, All-Weather and Sure Grip. The former is for both trailing and driving in earth-moving operations. The latter has as its primary purpose the delivery of special traction for the driving wheels. The new tire fits a 5-degree taper rim with sufficient compression under the bead to prevent slippage at low air pressure, Goodyear says.

Spiral Tubing Finds Many Uses in Field

Spiral metal tubing is now being offered for a wide number of construction uses by the Pratt Industries, Inc. Originally just in the automotive-muffler business, Pratt expanded its scope during the war and is now finding additional markets for its tubing.

The firm offers spiral tubing of any length in a diameter range of 2 to 8 inches. The product is described as lightweight, extremely rigid, and low in cost. One man can carry three 20-foot lengths, and can lay several thousand feet a day in irrigation and drainage work, the firm claims.

The tubing is formed spirally from steel or non-ferrous strips, the edges of which are joined in a continuous 4-ply lock-seam. These seams have withstood a 2,135-pound pull during tests. And a 2-foot section of tube, set on end, has supported more than a ton without measurable distortion, Pratt says. The wall thickness of tubing thus tested was 0.030 inch.

Contractors interested in applying this spiral tubing in their work should write to the Pratt Industries, Frankfort, N. Y. Tell the firm you read this CONTRACTORS AND ENGINEERS MONTHLY news report.

Waterproofing Data

The service record of Hydrozoo, a waterproofing substance for use on concrete, wood, canvas, and many other surfaces, is outlined in a 4-page bulletin issued by the National Hydrozoo Co., 5234 St. Clair Ave., Cleveland 3, Ohio. The substance can be applied and then painted; or it can be mixed with the paint and then applied. The bulletin will be sent at your request. Tell the firm you saw this notice.

Rapid Reverse Marks Truck-Tractor Winch

Three sizes in a new series of Rapid Reverse single-lever winches for trucks and tractors have been put into production by Gar Wood Industries. The firm has also announced a new line of worm-gearred winches for Allis-Chalmers tractors engaged in heavy-duty slow-speed towing. These winches are made in three models and have a maximum line pull of 60,000 pounds.

The three new single-lever models have pulls of 15,000, 30,000, and 60,000 pounds. Powered from the drive shaft by a take-off, they are said to lend themselves readily to remote-control operation.

A single straight-line shift permits instant change in direction at full load and under full speed, Gar Wood says, and the engine clutch need not be engaged or disengaged. Complete control of forward, reverse, and neutral is thus possible. "Deadman" control features the clutch, which returns to neutral if

the control lever is released. Pressure must be maintained on the lever to keep the clutch engaged. The shock of engagement at full load and speed is absorbed by a Torflex sprocket with rubber bushing.

Full details about this new line of Rapid Reverse winches can be secured by writing Gar Wood Industries, Inc., 7924 Riopelle St., Detroit 11, Mich. Mention this notice.

Heavy Tamping Roller

Weighing 10,200 pounds loaded, the Ferguson 112 standard tamping roller produces a pressure of 242 pounds per square inch. Design and constructional features of this heavy-duty tamper are outlined in a folder issued by the Shovel Supply Co., 4900 Hines Blvd., Dallas 1, Texas. The firm will send the folder to you on mention of this notice.

SPEED OPERATION for Snow Plows and Road Machinery with the . . .

MONARCH New and Improved HY-LO-JACK

Fan Belt Driven

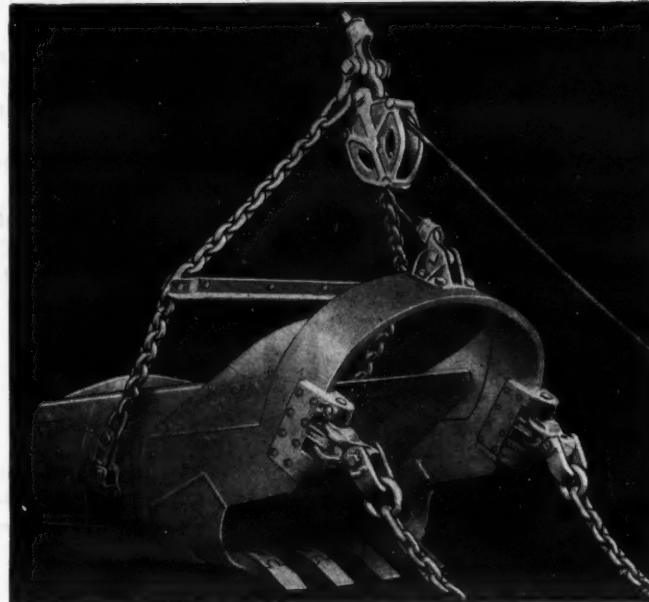
Power Hydraulic Control

Lifts plows ten times faster than hand pump. Cab-controlled. Easy installation on new or existing equipment. Priced for the most conservative budget.

WRITE FOR CIRCULAR H-75

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New Airport Is Hewn In Solitude of Desert

**One 7,300-Foot Runway and
Two Taxiways Are Given
Hot-Mix Surface; Weather,
Shortages Slow \$365,000 Job**

♦ THE Civil Aeronautics Administration has finished another new airport. The two-runway field is located at Battle Mountain, in Lander County, Nevada. It is about as far from civilization as you could put a flying field and still have it on the direct air route between San Francisco and Salt Lake City. But the privilege of bringing a plane in to its 7,300-foot asphaltic-concrete-surfaced runways will mean as much to aviators as the way station at Battle Mountain meant to the Pony Express riders in the roaring seventies.

Dogged by an early spell of freezing weather, equipment shortages, and the problem of enticing labor to come to Battle Mountain to work, Contractors H. W. Polk and Roy Cram of Las Vegas had to finish the \$365,000 job on penalty-clause time. It was let on July 16, 1945. Only 120 calendar days were allowed for completion. Operations were suspended November 11, 1945, by order of the CAA, due to an early freeze. It was impossible to issue the resumption order until May 6, 1946. However, the job was virtually finished when it was visited this past July.

The new field is part of the CAA's program for the development of civilian landing facilities. Local and itinerant planes, and planes operating feeder-line services will use it. It is likely to be designated an alternate for Reno and Elko, and commercial, military and private airplanes flying between San Francisco and Salt Lake City will make emergency and bad-weather landings there. A CAA communications and weather-recording station is located permanently at Battle Mountain Airport. The new field is about 4½ miles east of the town of Battle Mountain, and 300 airline miles west of Salt Lake City.

The first 7,300-foot paved runway, lying northwest to southeast, was built by the Public Roads Administration for use by the Army. Now that the present contract is finished, the airport will be usable under almost all flying conditions. The recent work consisted of a northeast-southwest runway 7,300 feet long, paved 150 feet wide. A 4,700-foot taxiway 50 feet wide connects the north end of the two runways. The ground was graded so that some time in the future, if the field requires it, that taxiway can be easily widened into a runway. Also included are a taxiway leading from the warm-up apron to the runway intersection, and a modern airport-lighting system.

Grading and Sub-Base Construction

The airport is set on a level plain 4,525 feet above sea level. Lofty mountain peaks, some still spotted with snow when summer temperatures soar to 100 degrees on the desert, rear up out of the loneliness. The few puny highways and telephone lines man has managed to carve through the desert defile it not at all. This, the desert Kit Carson knew, is the airport locale.

Four Wooldridge Terra-Cobra self-powered hauling scrapers, together with Caterpillar tractors and LeTourneau Carryalls, were used to rip up the desert and establish grades. After they had finished the fill to its grade lines, pit-run gravel was brought in and placed in two lifts to a depth of 12 inches. It was taken from borrow pits off to one side of the new runway, and watered. Sheepfoot rollers drawn by Caterpillar D8's took care of compaction; specifications called for 95 per cent

of modified Proctor density.

Gravel was then processed through a screening plant and placed in two lifts on top of the pit-run sub-base to a depth of 9 inches. It was spread and compacted by the same equipment used on the sub-base course plus pneumatic and flat-wheel rollers. This select material had to meet the following gradation requirements:

Sieve Size	Per Cent Passing
2-inch	70-95
1½-inch	
1-inch	
¾-inch	
No. 4	30-55
No. 40	10-25
No. 200	3-10

The top of this select material was rolled to a true cross section, so that

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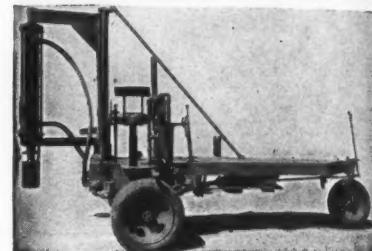
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RAPID PAVEMENT BREAKER**

Fastest Pneumatic Method

Cuts Cost and Time

Works Inside or Out

Good for all Small Jobs



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Los Angeles 21, Calif.**



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MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN

New Airport Is Hewn In Solitude of Desert

(Continued from preceding page)

when the hot-mix paving was laid down a minimum of screed adjustment on the finisher and raking would be required. The completed base then received 0.4 gallon per square yard of Bell Oil Co. MC-1 asphalt, applied at a temperature of 175 degrees F with a pressure distributor. This prime coat was allowed to cure from one to three weeks before paving. One section which lay through the winter received more priming when work started again in the spring. Applied at the upper limit of temperature, the asphalt penetrated about $\frac{1}{8}$ inch.

Hot-Mix Asphaltic Surfacing

Polk and Cram made their mineral aggregates at Battle Mountain Airport and batched asphaltic concrete through a Madsen No. 117 asphalt plant. Runway sections for 200 feet at both ends called for paving 3 inches thick; the remainder called for 2 inches. Paving started with a 10-foot strip along the center line of the runway, and continued towards the edges in successive 10-foot strips.

The paving mix consisted of 1,700 pounds of aggregate, 1,300 pounds of fines, and 180 pounds of 120 to 150-penetration paving asphalt furnished by the Union Oil Co. It was batched by the Madsen plant, which had a capacity of 4,000 pounds to a batch. A fleet of four Ford trucks with over-size dump bodies was used to haul the hot-mix material to the finisher. Some of these were owned by Polk and Cram; some were rented. Truck beds got a diesel-fuel wipe every other load, and loads were not covered.

The hot-mix was dumped into a Barber-Greene asphalt finisher, which moved along with the previously poured edge as its guide. A dump man spotted trucks. A finisher operator, a screed man, and two rakers made up the crew. It was next to impossible for Polk and Cram to hire experienced paving men. Rakers, screed men, and broomers had to be broken in. However, this handicap was partially offset by experienced finisher operators. The CAA got its runway true to a tolerance of $\frac{1}{4}$ inch on a 10-foot straight-edge, but only because the base course had been laid down to such true lines.

The Barber-Greene finisher has a tamping bar which puts about 55 per cent of the ultimate compaction in the hot-mix as it moves along. In order to take care of the rest of the compaction, Barber-Greene screeds were set for a $\frac{3}{4}$ -inch thickness to get 3-inch paving, and $\frac{1}{2}$ inches to get 2-inch paving.

CAA specifications called also for not less than 92 per cent of the calculated theoretical density on asphaltic concrete. In case you are slide-rule minded, the CAA equation to figure theoretical

density goes like this:

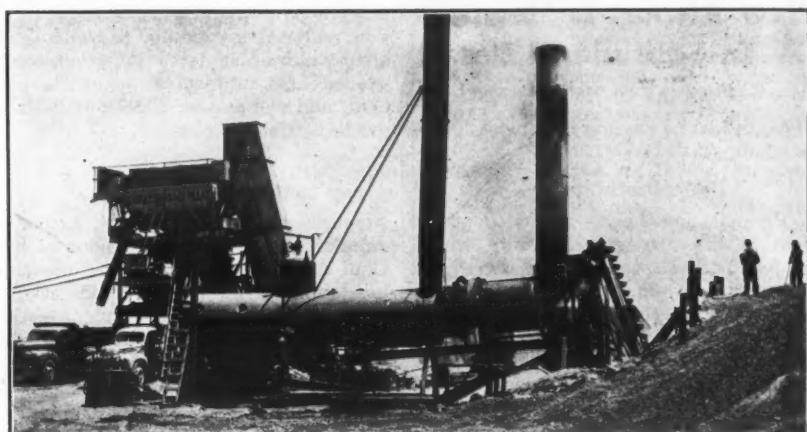
$$\text{Calculated density in pounds per cubic foot} = \frac{(100)}{\text{PAw}} + \frac{(62.4)}{\text{SGa}}$$

where:

PAw equals per cent of aggregate by weight
SGa equals specific gravity of aggregate
PBw equals per cent of bitumen by weight
SGb equals specific gravity of bitumen

This density was obtained in the field at Battle Mountain, with very slight variations. The asphaltic-concrete paving was rolled about 15 or 20 minutes behind the finisher by a 10-ton 3-axle Buffalo-Springfield smooth roller. The machine worked longitudinally, rolling the asphaltic concrete at the highest temperature practicable without causing checks or cracking. Each construction joint was left vertical, and the next day's work was blended to this joint.

Finished pavement was sealed with 0.2 gallon of RC-2 asphalt per square yard, applied by a pressure distributor, and followed by coarse-sand screenings at the rate of 10 pounds per square yard. These screenings were rolled in by the



C. & E. M. Photo
Asphaltic concrete for runways at the new Battle Mountain Airport in Nevada was mixed in a Madsen No. 117 plant.

Buffalo-Springfield roller, and the excess swept off by an Austin-Western broom.

The high bitumen content in the soft asphalt (120-150 penetration) of this

pavement should keep the strips alive for a long period of time under blistering summer sun, winter ice and rain, and light ground traffic. Officials be-

(Concluded on next page)

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New Airport Is Hewn In Solitude of Desert

(Continued from preceding page)

lieve this is the key to economical, long-wearing surfaces.

Drainage

Precipitation is not a particular problem at the airport. The only water which people see around there for months at a time comes out of deep wells. Therefore the shoulders of the new runway and taxiways were sloped to small drainage ditches. These dump surface water through grouted-rock spillways into two select borrow pits, where 60,000 cubic yards of gravel was dug. The sides of these pits have been bulldozed until they blend with the desert, and the pits will serve as a catch basin in case of heavy rainfalls. Construction scars will blend with the desert and disappear in a year or so.

The runway shoulders were built of select material for the first 100 feet out-

side the paved area, with 75 feet of random material beyond that to give a total strip width of 500 feet. Shoulders were graded to a uniform slope of 1½ per cent, and compacted. The longitudinal grade is 0.06 per cent.

Personnel

The airport was under the general supervision of J. S. Marriott, Regional Administrator of the 6th Region of the Civil Aeronautics Administration, with headquarters at Santa Monica, Calif. A. H. Hadfield is Superintendent of the Plant and Structures Branch. Harold C. Orville is Chief of the Plant and Structures Construction Division. King C. Quillman was Resident Engineer. Leo J. Kennelly was the most recent of five superintendents on the project for the contractor.

Completion of Battle Mountain Airport in this remote desert wasteland will be a boon to civilian airmen, as well as a monument to the courage of men who endured the worst kind of climate to get it built.

Motor-Grader Brochure

The motor grader comes into the spotlight in a brochure issued recently by the Caterpillar Tractor Co. to publicize the accomplishments of its graders. The story of the methods used in varied phases of construction and maintenance is graphically told in the 12-page booklet. Photographs show Caterpillars on the job in many sections of the country.

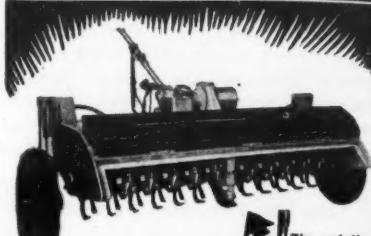
You can obtain this motor-grader booklet by writing the Caterpillar Tractor Co., Peoria 8, Ill. Mention this story and ask for Form 9460.

Chain Belt Buys Plant

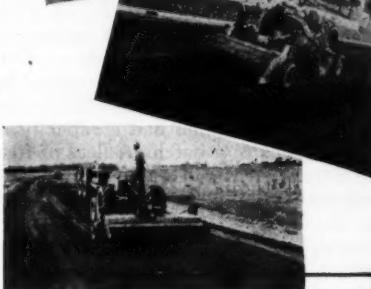
A wartime ordnance plant in West Milwaukee has been purchased by the Chain Belt Co. to use for the manufacture of chain belts and some construction machinery. Built in 1943, the plant is a one-story structure with a two-story office bay. It covers an area of about 317,500 square feet.

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**AN EXTRA MILE
EVERY THREE DAYS**



The swirling, chopping action of the fins does the job!



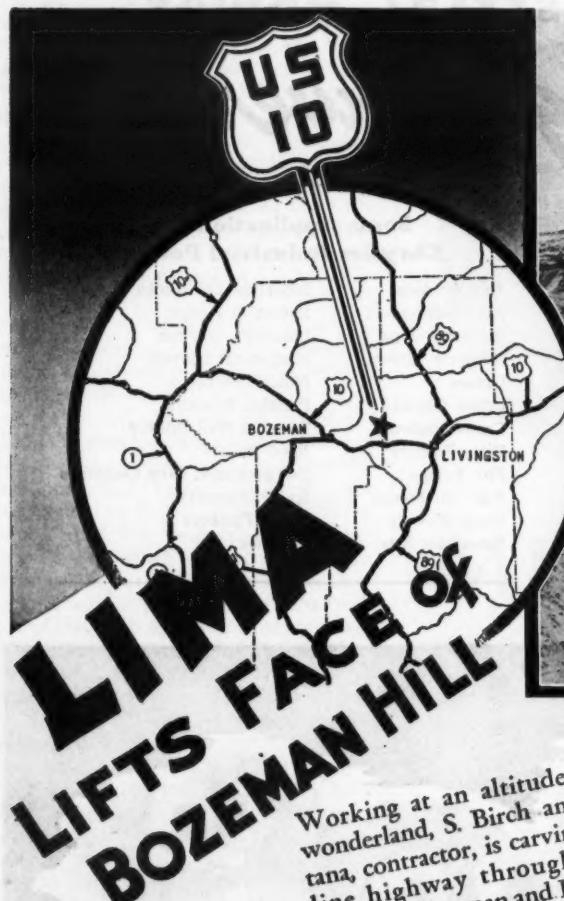
ARIENS AGGMIXER is equipment especially designed for use wherever aggregates are used, such as all types of bitumens, cements, clays, chlorides, etc., to be operated in connection with other general purpose road equipment. On farm-to-market roads an average of a mile per day can be mixed, as compared with two miles every three days when only graders are used. Ariens AGGMIXER does a thorough job, rapidly and economically, without displacing the materials on the road surface, thoroughly pulverizing, mixing and aerating the aggregates with the binder used, and may be operated wet or dry.

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Mark well this button. It is worn by the men and women honorably discharged from the armed services. Though they are now in civilian clothes, let's not forget their service to our country and to us. They still rate our every consideration.

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Uncle Sam's Obligation

When Party to Contract

If Uncle Samuel, Washington, D. C., were as hard a bargainer as some of his own lawyers would make it appear, he certainly would be a cussable old skinflint. Take, for example, the case of *Sylvan Crest Sand & Gravel Co. v. United States*, 150 Fed. 2d, 642, lately decided by the United States Circuit Court of Appeals, Second Circuit.

The Treasury Department's Procurement Office in Connecticut invited bids on trap-rock needed for airport construction. The gravel company filled out a single-sheet form provided by the Government. It was headed, "Invitation, Bid, and Acceptance. (Short-Form Contract.)" First, there was a brief invitation to bid, followed by a stipulation to furnish approximately 4,000 tons at a unit price of \$2, "to be delivered to project as required. . . . Cancellation by the Procurement Division may be effected at any time." The Assistant State Procurement Officer signed the statement, "Accepted as to items numbered 1".

Incorporated by reference were "Conditions" on the reverse side of the document. Those conditions implied the execution of a binding contract. There were three other similar transactions.

The company later sued for profits lost through the Government's refusal to order or accept the material. The United States District Court for Connecticut decided that the document gave the Government such unrestricted power to cancel that there was no binding contract. Reversing the decision and ordering a new trial, the Court of Appeals declared in part:

"No one can read the document as a whole without concluding that the parties intended a contract to result from the bid and the Government's acceptance. If the United States did not so intend, it certainly set a skilful trap for unwary bidders. No such purpose should be attributed to the Government. . . . In construing the document the presumption should be indulged that both parties were acting in good faith.

"Although the acceptance contains no promissory words, it is conceded that a promise by the defendant", the Government, "to pay the stated price for rock delivered is to be implied. Since no precise time for delivery was specified, the implication is that delivery within a reasonable time was contemplated. . . . This is corroborated by the express provision that the rock was 'to be delivered to the project as required. Delivery to start immediately'. There is also to be implied a promise to give delivery instructions; nothing in the language of the contracts indicates that performance by the sand and gravel company 'was to be conditional upon the exercise of the' Government's 'discretion in giving such instructions. A more reasonable interpretation is that the' Government 'was placed under an obligation to give instructions for delivery from time to time when traprock was required at the project.'

As to the clause stating that the contract might be canceled "at any time", the Court of Appeals reasoned:

"We believe that the reasonable interpretation of the document is as follows: 'We accept your offer to deliver within a reasonable time, and we promise to take the rock and pay the price unless we give you notice of cancellation within a reasonable time.' Only on such an interpretation is the United States justified in expecting the plaintiff to prepare for performance and to remain ready and willing to deliver. Even so, the bidder is taking a great risk and the United States has an advantage. It is not 'good faith' for the United States to insist upon more than this. . . . Hence the agreement obligated the defendant to give delivery instructions or notice of cancellation within a reasonable time after the date of its 'acceptance'. This constituted consideration for the plaintiff's promise to deliver in accordance with delivery instructions, and made the agreement a valid contract."

"Adjacent" Not "Subjacent"

If one must gamble, we recommend bucking that "two-shell" game commonly referred to as litigation, as against the game where three shells, a rubber "pea", and the manipulator's finger nails are used. There is bound to be a decision—sooner or later—under one of the two shells. So, you'll have some chance of winning.

In a Missouri case, the elusive "pea" was the meaning of the words "adjacent" and "excavation" in a liability insurance policy covering a sewer contractor's operations but excluding liability for causing collapse or injury to any structure adjacent to the sewer site due to excavation. The contractor was

required to construct a sewer tunnel under a building which was injured in consequence. The insurance company disclaimed liability under its policy and litigation resulted, but the contractor's lawyers guessed the shell under which the decision of one of the Missouri Courts of Appeal would be found.

After reviewing judicial and dictionary definitions, etc., dealing with the words "adjacent" and "excavation", the court concluded that the policy exception did not exclude liability for injuries caused in tunneling under a building. The Court of Appeals said: "Excavation is defined in 23 C. J. 179 as an uncovered cutting in the earth as distinguished from a covered cutting or tunnel. This we think is the common ordinary meaning of the word. A tunnel is not ordinarily spoken of as an excavation. Nor is the operation of constructing a tunnel ordinarily spoken of as excavating." In any event, the court declared, there was no excavating adjacent to a building when a tunnel

was constructed underneath it. (Bituminous Casualty Corp. v. Walsh & Wells, 170 S. W. 2d, 117.)

Contracting Officer To Blame, Court Finds

A Government construction contract exempted the contractor from liability for liquidated damages arising from delayed performance that was, in turn, due to unforeseeable causes, including strikes. It required the contracting officer to determine

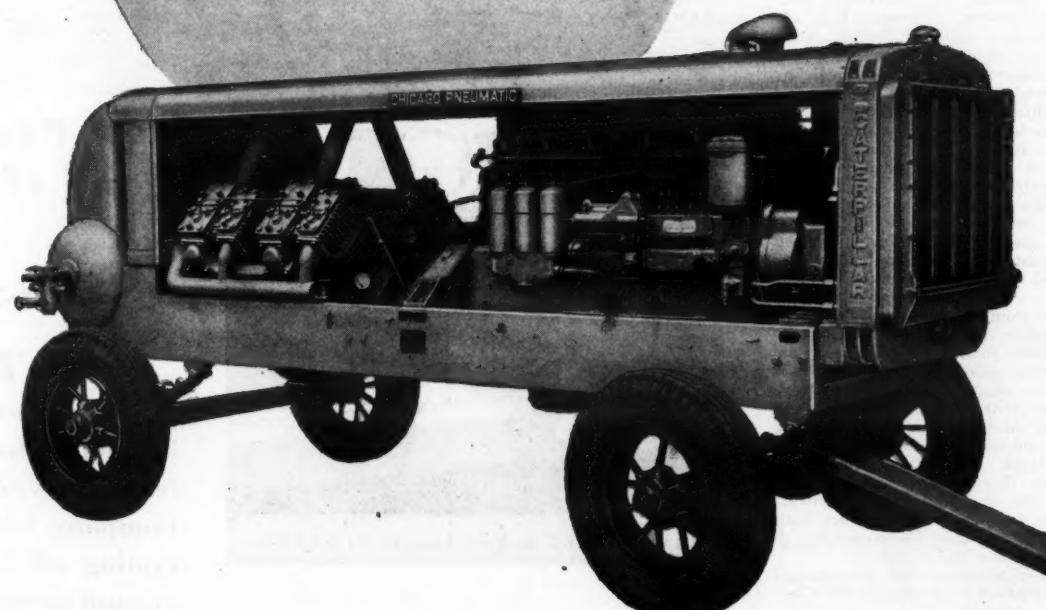
the extent of delay and to extend the time for completing the work on his finding that an extension was justified. The contractor applied to the contracting officer for an extension of time, but the application was not acted upon. Accordingly, no allowance for excusable delay in performance was made by the Government in deducting from the contract price the amount of liquidated damages specified in the contract.

The contractor's surety filed a claim against the Government on the ground that its loss (Concluded on next page)



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Avoid Legal Pitfalls

(Continued from preceding page) under the bond was increased by the Government's failure to allow the contractor a deduction from the liquidated damages assessed. Upholding the surety's claim, the United States Court of Claims decided that the contract made "it mandatory upon the contracting officer to make findings of fact upon the application for extension of time and to grant or refuse the extension. His failure to do so is a breach of the obligation cast upon him and justifies this court in remitting liquidated damages deducted to the extent of any extension of time that should have been granted by the contracting officer." (Manufacturers' Casualty Ins. Co. v. United States, 63 Fed. Supp. 759.)

Government Is a Party To Subcontract Indirectly

The mere fact that, in general form, the Federal Government was not named party to a subcontract did not make it any less the party to whom the subcontractors were bound to look for reimbursement for extra wages, etc., paid in the performance of the subcontracts. An opinion to this effect was rendered by the United States Circuit Court of Appeals, Tenth Circuit, in the case of Ogden Electric Co. v. Engineers, Ltd., 151 Fed. 2d 657.

Defendant contracted to construct a Government hospital on a fixed-fee basis. The contract permitted subcontracts, but the Government reserved the right to pay the subcontractors. The subcontract referred to the prime contract and provided that the Government would pay the subcontractors, etc. The subcontractors, plaintiffs, sued defendant to recover extra wages, etc., paid. The Circuit Court of Appeals upheld a judgment of the United States District Court, District of Utah, dismissing the suit. It held that the claim was enforceable against the Government, if enforceable at all. The Court of Appeals reasoned:

"It is true that the subcontract named only the electric companies and the contractor as parties thereto, and that the contractor agreed to pay the consideration due thereunder. But the subcontract referred to the main contract. It specifically provided that the Government would pay directly the labor and material claims arising thereunder. It further provided that it was subject to supervision and approval by the Government's contracting officer, and that it was subject to renegotiation with the Government as to any excessive profits. The electric companies also knew that the contractor received a fixed fee for its supervision of the entire construction project, and that in fact the entire cost of the project was paid by the Government.

"While the electric companies submitted monthly estimates to the contractor for sums expended for labor and material, these were merely audited and approved by the contractor and then in turn were submitted to the contracting officer for the Government, and when finally approved by the Government were paid directly by the Government to the electric companies. There is no evidence that the contractor at any time paid the electric companies anything for their expenditures in the performance of the subcontract. All of this clearly indicates that the Government was the real party in interest, and that the subcontract of the electric companies was in fact with the Government, and that the parties thereto so understood the transaction."

The court also observed that the subcontractors had impliedly recognized the Government's sole obligation by making an unsuccessful attempt to collect from it.

Tentative Time Plan Mistaken for Guarantee

Bidding specifications on a Federal dam-construction job in Idaho mentioned a "tentative construction program" shown by drawings. The specifications said that the program, "if followed," would permit completion within 450 days from the date of order to proceed, assuming that the order be given September 1, 1936. But the specifications warned that the "Government assumes no responsibility for any use that bidders" might make of the program data.

The order to proceed was not given until June, 1937. And on account of winter conditions, it took considerably more than 450 days to finish the job. The contractor claimed damages for the increased cost that resulted from having to perform the work in three seasons, instead of two as indicated in the Government's tentative plan.

Disallowing the claim, the United States Court of Claims said (S. J. Groves Sons Co. v. United States, 64 Fed. Supp. 472): "Plaintiff is therefore plainly precluded from asserting that by this 'tentative construction program' the defendant warranted that work could be performed in the time shown

therein. Defendant made no representation as to the time within which work could be performed in any one year. This, of course, varied from year to year. Defendant would not have been so foolish as to warrant what the weather would be, especially in this locality of exceptionally heavy snows."

Extra Costs Awarded

The State opened a parkway to travel before it had been completed and accepted. It therefore became liable to the contractor for costs involved in hauling additional topsoil, which was necessitated by the premature opening. (A. W. Bank, Inc., v. State, 60 N. Y. Supp. 2d 758, decided by the New York Court of Claims.)

Aggrieved Party Must Minimize His Damages

There is an ABC rule of law that applies when a contract is broken or other wrong is committed: the aggrieved party cannot recover damages for any part of his loss that he could have avoided by taking steps open to him. It was applied by the California District Court of Appeals in a case where the lessee of an asphalt plant, a highway contractor, negligently caused loss of the plant by fire. When the loss occurred, the lessee offered to agree upon reconstruction of the plant. But the lessor refused. His reason was that the lessee insisted on a clause reserving for future determination questions that concerned liability for the losses sustained. This delayed reconstruction; consequently the lessor lost profits that he could have derived had there been prompt reconstruction. The court decided that the lessor was not entitled to recover on the lost-profit claim. It said: "It was the lessor's



"duty to take such reasonable steps as would avoid or minimize his own losses by any reasonable exertion without serious expense to himself." (Roselip v. Raisch, 166 Pac. 2d 340.)

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Danger—Explosives; Use Care and Caution

**Blasting Accidents Are
Unnecessary and Costly;
Play Safe at All Times
By Following the Rules**

MAN-SIZED expletives (cuss words to you!) have long been the construction man's favorite form of "explosion". However, during the big construction program immediately ahead, he is going to be occupied with more than the verbal type of explosion. He is going to have to do considerable rock blasting, fill settlement, and tunneling to make way for the great system of highways, airports, and other public works which the nation is planning. And the explosives used for this work are going to add to his problems.

Using explosives is a ticklish job at any time. As the Institute of Makers of Explosives points out, "explosives are intentionally produced so that they will explode, and with sufficient provocation they will do so". Moreover, the "green" hands who will comprise much of tomorrow's construction crew will be an added hazard where blasting is going on. Even if they themselves are not entrusted with explosives, they must know how to act when blasting is being done.

To protect his workers, to safeguard the lives and property of the neighborhood, and at the same time guard his own equipment and investment, the contractor must follow a comprehensive program of blasting safety. He must see to it that extreme care is exercised around explosives at all times. His failure to do so may lead not only to personal tragedies, but to loss of time and income and damage to his professional reputation.

Danger Is Always Present

Where explosives are concerned, there are few "minor" accidents, as any safety man will tell you. Even the small ones can cause great injuries, and many a big explosion has been set off by a much smaller one. For this reason, the best safety policy the contractor can adopt is one of preventing the accidents before they happen. This demands a balanced program of education, supervision, and discipline, all strictly adhered to. And it must apply equally to all workers, from top personnel down.

Everyone on a blasting project should be made aware of the nature of explosives and their danger. As few persons as possible should handle them, and these should be fully trained in the proper safeguards. Strict regulations, strictly enforced at all times, should be maintained. Remember, the penalty for non-compliance may be death.

Wherever blasting is going on, the workmen in the area should be briefed on what to do for safety, where to go for shelter, and what action to take in case of an accident. Foremen should make certain that all hands leave the area before the blast. Special precautions should be taken to guard motor-

ists, passers-by, hunters, livestock, hoboes, and children who may wander onto the blasting area.

Possibly the greatest danger in handling explosives is carelessness rather than inexperience. Often it is the "very experienced" man who blows himself and his crew to smithereens. For when one is exposed to danger day in and day out, there is a tendency to grow calloused, unconcerned, and even reckless. This only leads to bloodshed. No matter how experienced a hand is, if he is careless or reckless he has no place in a blasting crew. Get rid of him before the place goes up in smoke.

The first thing the contractor and every man working for him should learn is a healthy respect for dynamite, TNT, and their kindred. Always

remember that it is the business of these products to explode; act accordingly.

Handling Explosives

Fools we shall have always with us, but they don't last long around explosives. Never use sparking metal in their vicinity. Many metals create sparks, and such sparks have an indecent habit of blowing the nicest people sky-high.

Speaking of sparks, if you must smoke on the job, follow the old saying and "walk a mile for your Camel". Otherwise you're liable to go up in smoke yourself. And the smoking ban means no smoking any place where explosives are, or have been.

For the same reason, fires are taboo anywhere near blasting operations or powder magazines. The areas around explosive storage should be kept clear of brush or other inflammable materials, so that should fire break out you can head it off before it reaches the explosive.



To forestall the danger of accident from particles of explosive, cases and packing should be burnt and not put to other use. But this should be done at a point far from where they were opened and from the magazines. Having made certain you won't start a brush fire, burn the boxes in small quantities, keeping a goodly distance be-

(Continued on next page)

UNIT 1020 MOBILE CRANE
WITH 3 AXLE UNDERCARRIAGE
10 TON CAPACITY

UNIT 357 MOBILE CRANE
WITH 2 AXLE UNDERCARRIAGE
5 TON CAPACITY

UNIT 1020 TRUCK CRANE
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UNIT 514 . . . 1/4 YD.
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UNIT 1020 . . . 1/4 YD.
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A 5005-1P-C-U



Danger—Explosives; Use Care and Caution

(Continued from preceding page)

tween yourself and the fire, just in case. Loose powder is a hazard anywhere, especially in the magazine or around other explosives. A box cracks a little and some powder seeps out. Along comes a worker, hobnail boots sparking underfoot, and "off we go into the wild blue yonder". Grains of powder, seemingly innocent, have a way of blowing up under heel, or when a tool drops on a near-by stone.

Safe Storage

The proper storage is primary in blasting safety, and most states have strict rules for the location and design of powder magazines. (It is essential to be fully acquainted with these and other local regulations.) Many accidents are directly attributable to faulty storage procedures. Every year hundreds of children are injured by "found" blasting caps, and many other accidents occur from mislaid explosives that are later stepped on or are picked up by the crane.

The moment explosives are delivered they should be entrusted to a competent person. He should see that they are stored carefully and in keeping with the law and safety rules. He alone should have access to the magazine, and only he should be entrusted with removal of explosives. An accurate record should be kept of all withdrawals and blasts, and all unused explosives should be returned to the magazine, never left on the job. The oldest stock should be used first, and the magazine should be locked when its guardian isn't around. Needless to say, he should leave his pipe at home.

The powder magazine should be remote from habitations, public ways, work areas, electric wires, and the danger of fire, sparks, and other hazards. It should be on open ground, just in case an autumn hunter mistakes it for a farmer and blazes away. All brush and other inflammables should be removed from the immediate vicinity.

It should be plainly marked EX-
PLOSIVES MAGAZINE—DANGER in large letters. Armor plating is recommended to keep out stray bullets from hunters and offset the danger of fire. The interior should be weathertight and watertight. It should be well ventilated with air vents, not windows, so arranged that sparks and rain cannot enter.

Painting the magazine with aluminum or other reflective paint is desirable both to identify it and to keep down the internal temperature. Wooden umbrellas, or secondary roofs, serve this latter need also. On one job in California's desert country as temperatures rose to 120 degrees, the contractor had to keep spraying the outside of the magazine with water to keep it cool.

Dampness, too, is a great danger

where explosives are concerned, since misfires are a direct result. Just as the magazine should not become overheated, neither should moist air be allowed to accumulate. Make certain that rain and seepage never get in.

The possibility of short circuits forbids the use of electric lights within the magazine, and, of course, lanterns should never be used. Sparking metal tools are also taboo, and the worker should be careful of his shoes and clothes to see that metal parts do not cause those fatal sparks. Some contractors are reported to have such a wholesome fear of sparking that they guard their magazines from loving couples at night.

Detonators should never be stored with explosives. Separate magazines should be used for the explosives, and for the fuses, caps, and other deteriorating devices. These items should be kept as far apart as possible, right until the time of blasting. They should travel to the face on different trips, or be carried in special containers by individual men.

On large blasting operations, the supplies needed for a shift or for a day are withdrawn from the magazines at one time and removed to another location. Here they are made ready for blasting, primers are inserted, etc. Even here, care should be taken that explosives and detonators do not get together sooner than intended.

Care in Priming

Priming plays an important role in safe blasting. Misfires, premature shots, delayed shots, and other dangerous features of blasting can often be traced to poor priming technique, or to deteriorated explosives which the primer should have weeded out.

Priming should always be done far from sizable amounts of explosives, since the added handling required increases the danger of an accident. It is often done at the face before setting the charge, or it can be done beforehand at a remote make-up house. However, do not make up primers too far in advance of their use.



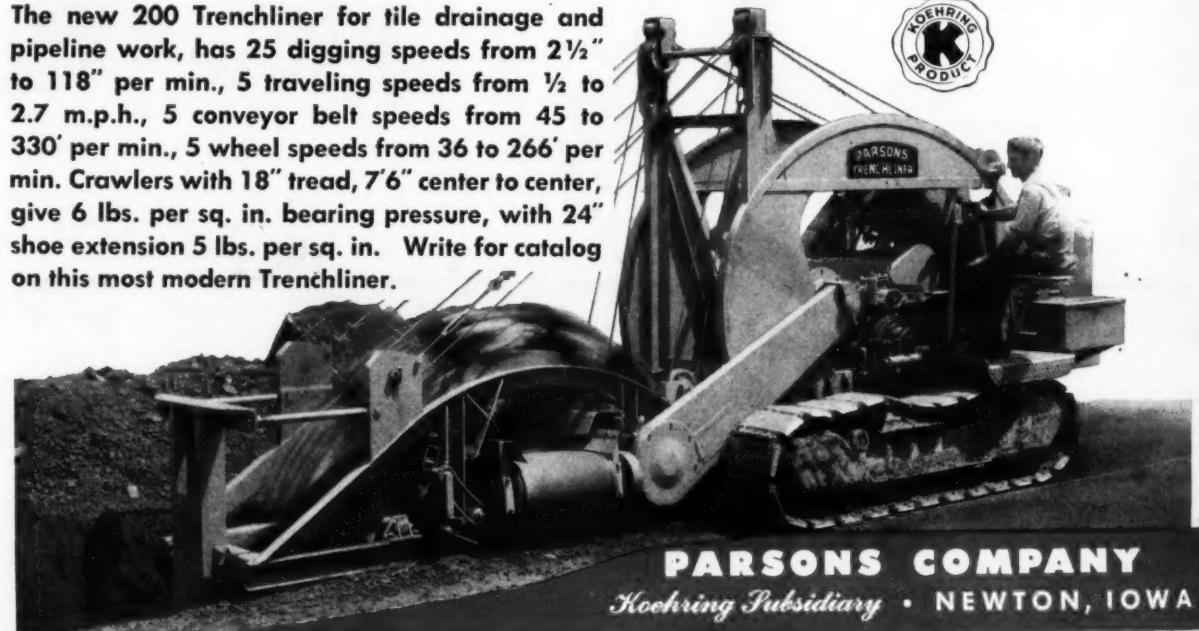
The methods of making the primer vary with the kind of explosive, the type of igniter or detonator, and the kind of blasting being done. All primers should be handled with the realization that they have greater potentiality for

(Continued on next page, Col. 4)

Parsons 200 TRENCHLINER

digs 15" to 26" wide, up to 5' 6" deep

The new 200 Trenchliner for tile drainage and pipeline work, has 25 digging speeds from 2 1/2" to 118" per min., 5 traveling speeds from 1/2 to 2.7 m.p.h., 5 conveyor belt speeds from 45 to 330' per min., 5 wheel speeds from 36 to 266' per min. Crawlers with 18" tread, 7' 6" center to center, give 6 lbs. per sq. in. bearing pressure, with 24" shoe extension 5 lbs. per sq. in. Write for catalog on this most modern Trenchliner.



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Johnson PORTABLE TWIN SILEO

STORES 1,550 BARRELS CEMENT

The largest of the Johnson Twin Silo Bulk Cement Plants stores 1556 barrels of cement. Smaller Johnson Twin Silo Bulk Cement Plants store 708, 990, 1274 barrels. Yet, their large storage capacity does not limit their portability. Disassembled units easily fit flat cars or flat bed trucks. Initial cost of the unit is low, with operating costs at a minimum.

Other Johnson Bulk Cement Plants include the Portable Section Unit (storage capacities: 280 to 500 bbls.), the Dutchmill (storage capacities: 50 to 150 bbls.) and the Elevating Charger, an unloading transfer and batching plant.

THE C. S. JOHNSON COMPANY

Koehring Subsidiary

CHAMPAIGN, ILLINOIS

Confine Road Building**To Urgent Jobs, PRA Asks**

Highway-construction activities should be confined to the most urgently needed work, says Thomas H. MacDonald, Commissioner of Public Roads. This request is made to avoid conflict with such essential programs as housing and also to avoid the various troubles which arise from beginning work that cannot be completed on a normal schedule.

PRA reports show that unstable conditions in the labor and materials markets have resulted in unsatisfactory progress on approximately 18 per cent of the Federal-Aid highway-construction jobs now under way. Retarded progress is even more evident on bridge construction. Unsatisfactory progress is reported on 120 structures out of a total of 463 bridges of 50-foot span or over. This is attributed to delay in deliveries of materials on 48 per cent of the delayed jobs, scarcity of labor on 16 per cent, and operational difficulties

due to other work on 18 per cent. Of the structures showing unsatisfactory progress, more than one-half are having difficulty in obtaining structural steel.

The Commissioner pointed out that jobs delayed by shortages of men or materials are costly. An equally important factor is the inconvenience, delay, and danger to the traveling public in being forced to use detours for much longer periods than would normally be necessary.

Barnes Dealer in East

Appointment of the George M. Pearse Co. as its sales representative for metropolitan New York City and for the Newark territory has been announced by the John S. Barnes Corp., Rockford, Ill., maker of hydraulic equipment. Pearse headquarters are at 965 Broad St., Newark, N. J.

Barnes has transferred Ernest C. Hawkins, for several years manager of its Newark sales branch, to a newly created Chicago office.

New Motor Oil

Developed during the war and used by the armed forces, Permalube has just been put on the public market by the Standard Oil Co. of Indiana, Chicago, Ill. This motor oil meets the "premium" standards established by the American Petroleum Institute for the lubrication of all automotive-type internal-combustion engines.

Refined by solvent extraction from mid-continent crude oil, Permalube is available in six SAE grades, 10-10W, 20-20W, 30, 40, 50, and 60. In addition to the usual properties present in a "premium"-grade lubricant, the new oil has a number of "plus" properties resulting from the introduction of certain patented ingredients, it is said.

The new oil will generally have a dark, dirty appearance when one makes a dip-stick examination of the crankcase fill. This is explained by the manufacturer as an advantage, since it indicates that the used oil is now carrying the impurities, leaving the engine clean.



Danger—Explosives; Use Care and Caution

(Continued from preceding page)

damage than either the cartridge or the detonator alone.

The igniter or detonator should be firmly attached to the cartridge in the safest and most effective position. Since the detonator exerts its greatest force away from the charged end, the fuse should parallel the longitudinal axis of the cartridge as closely as possible. This avoids the spending of the force on the stemming or bore-hole walls.

The fuse should be warm before cutting, so as not to fracture its waterproof coating. It should not be bent sharply. Ends that have been exposed for some time should be cut off with a clean sharp blade to avoid smearing the waterproofing across the powder train. Before and after cutting, the fuse should be handled carefully lest powder be lost from the core before insertion in the cap. It should be cut squarely across, never at a slant or bevel. Crimping should be done with a standard crimping tool.

Enough fuse should be cut to reach from the primer in the bore hole to the collar, with a minimum of 2 feet left outside. This portion outside the hole should be long enough to allow the blaster to reach safety after lighting. Short-fusing your explosives means short living.

Blasting caps should not be removed from their container until they are to be used. Care must be exercised in shaking caps from the can, and they should never be "picked" at. Caps which foreign matter has entered should never be used, unless the matter comes out with gentle shaking.

Gentleness is also required when seating the fuse on the explosive charge in the bottom of the cap shell. The powder core of the fuse should be in actual contact with the explosive compound in the cap. A tight crimp should hold the cap in place, and the cap should be waterproofed, if necessary. Short-circuited electric blasting caps are the best insurance against premature explosion by stray currents, explosive makers say.

Follow the Rules

Of course any or all the precautions listed in this article can be (and often are) disregarded without the dire results we have hinted. But there is always a first time! Many a construction man in heaven (or elsewhere) today owes his premature arrival to the fact that he or someone else figured, "I've done it this way for years and nothing has ever gone wrong".

Blasting operations in construction range all the way from removing stumps to creating bores in rock far below the surface of the earth. This article could go on indefinitely were it to outline specific safety rules for each type of

(Concluded on next page, Col. 2)



More Yards MOVED PER H.P. because every Main Shaft rolls on Anti-Friction bearings

On the Koehring 205 engine horse power rides to work in style, on anti-friction bearings. All major shafts—drum shaft, counter shaft and swing shaft—are mounted on ball bearings. Because there's little friction to waste engine horse power, greater digging force gets to the business end. Power saved pays off in extra yardage. Lubricating time is reduced, because bearings are sealed tight to hold lubricant, to lock out dirt and moisture.

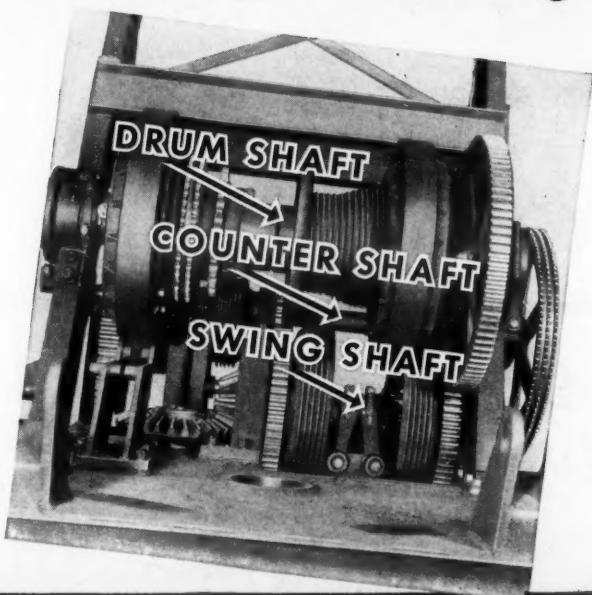
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HEAVY-DUTY CONSTRUCTION EQUIPMENT



Convention Calendar

Nov. 12-13, 1946—SE Highway Officials

Annual meeting, Southeastern Association of State Highway Officials, Tutwiler Hotel, Birmingham, Ala. H. J. Neale, SASHO Secretary-Treasurer, Virginia Department of Highways, Richmond 19, Va.

Dec. 5-8, 1946—Highway Research Board

Annual meeting, National Academy of Sciences and National Research Council Bldg., Washington, D. C. Roy W. Crum, Director, 2101 Constitution Ave., Washington 25, D. C.

Dec. 17-20, 1946—AASHO

Annual meeting, American Association of State Highway Officials, Biltmore Hotel, Los Angeles, Calif. Hal H. Hale, Executive Secretary, 1220 National Press Bldg., Washington 4, D. C.

Jan. 27-30, 1947—AGC

Annual convention, Associated General Contractors of America, Stevens Hotel, Chicago. H. E. Foreman, Managing Director, Munsey Bldg., Washington 4, D. C.

Feb. 13-16, 1947—AED

Annual meeting, Associated Equipment Distributors, Edgewater Beach Hotel, Chicago. C. F. Winchester, Executive Secretary, 1928 Eye St., N. W., Washington, D. C.

Feb. 17-20, 1947—ARBA

Annual convention, American Road Builders' Association, Palmer House, Chicago. Charles M. Upham, Engineer-Director, International Bldg., Washington 4, D. C.

Lidgerwood Moves

To reorganize its manufacturing facilities, the Lidgerwood Mfg. Co. has disbanded its plant and organization at Elizabeth, N. J., and will concentrate activities in its other centers, mainly at Superior, Wis., and Beacon, N. Y. The company will be known in the future as the Superior-Lidgerwood-Mundy Corp. The executive offices are now located at 7 Dey St., New York 7, N.Y.

Increased efficiency and economy of operation are expected from the move. The new centers afford more suitably located shipping points for the firm's hoisting, conveying, and marine auxiliary equipment.

Light, Power Generators

Portable electric generating plants for on-the-job needs are supplied by the Griffin Equipment Corp. The line includes plants capable of producing from 1,500 to 9,000 watts, and others in the 7½ to 12½-kw range, as well as trailer-mounted lighting units, and heavy-duty generators.

A 12-page catalog describing these Griffin generators will be sent on request. Write to the firm at 881 E. 141st St., New York 54, N.Y., for Bulletin 146, and mention CONTRACTORS AND ENGINEERS MONTHLY.

New FWD Distributors

New distributors appointed by The Four Wheel Drive Auto Co. will serve as outlet for the firm's trucks in Indiana, Arkansas, and Oklahoma. The Flesch-Miller Tractor Co., Indianapolis, will serve the southern part of Indiana. R. A. Young & Son, Fort Smith, will represent FWD in Arkansas and in seventeen Oklahoma counties.

Danger—Explosives; Use Care and Caution

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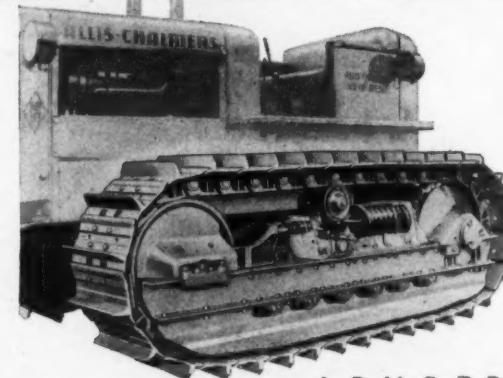
blasting task. (Some of these will be discussed in subsequent issues.) However, we'll have done our initial job if

we have reminded you once more that dynamite is dangerous, and "up is a long way".

CONTRACTORS AND ENGINEERS MONTHLY will be glad to aid you further in achieving blasting safety. The precautions we have outlined are amplified in pamphlets issued by the Institute of

Makers of Explosives, and we'll be glad to send you copies. Why not drop a card to 470 Fourth Ave., New York 16, N. Y., now?

The Community Chests of America and the USO are again asking for your support. Give generously.

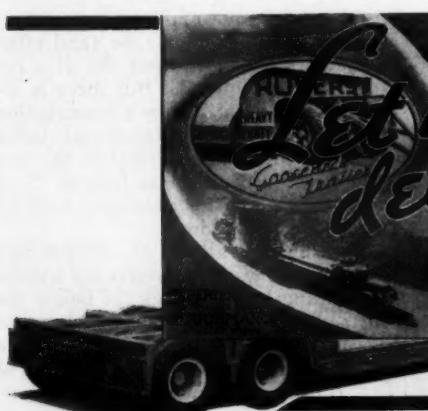


L-O-N-G T-R-A-C-K

Gives you
IMPROVED TRACTION...
IMPROVED BALANCE....
IMPROVED RIDING.....
IMPROVED PERFORMANCE

* Ground contact is increased over ten per cent, ground pressure reduced, with two more shoes per track. Truck frame is longer and heavier. Additional truck roller on each track reduces wear and tear. Extra heavy front spring makes HD-10 especially desirable for working with front or engine mounted equipment.

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IT'S FULL OF VITAL
FACTS & INFORMATION
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IF THINKING OF
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EXPERIENCE builds 'em... PERFORMANCE sells 'em

Keep On
BUYING BONDS
★ ★ ★
DON'T SKIMP!

Rock-Jetty System Built at Long Beach

Cranes Place Heavy Stone From Temporary Trestles; Will Check Erosion and Increase Beach Width

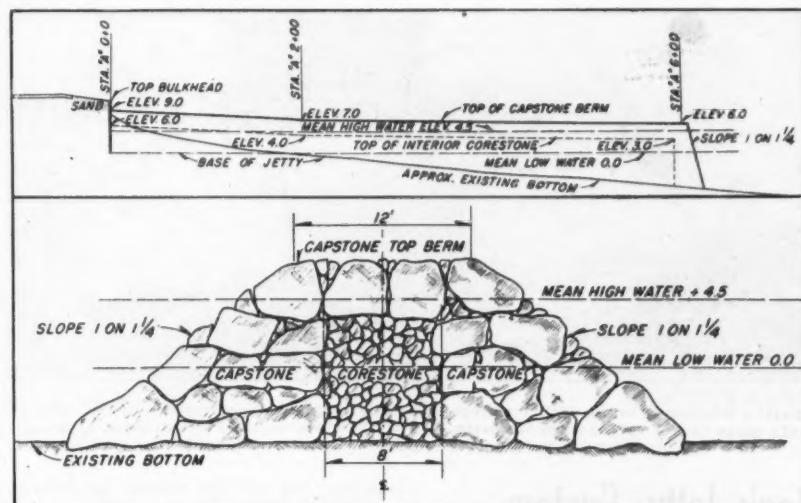
THE western section of the City of Long Beach, N.Y., has suffered possibly more damage from direct wave attack and erosion than any other part of the south-shore coast line of Long Island. It is now getting much needed protection by a system of rock jetties. These are being built not only to preserve the existing beach, but also to restore its original width by the gradual accretion of sand between the jetties. The predecessors of the six new rock jetties, some old timber jetties, failed to provide ample protection for shore property at this Nassau County beach resort, which was hard hit by two easterly storms in October, 1943, and January, 1944, and by a hurricane in September, 1944. During these storms 46 homes were completely destroyed and hundreds of others severely damaged. Well over \$500,000 of damage was done to streets, bulkheads, public utilities, and private property. Without the new and strongly built jetties, the west end of the city of Long Beach was vulnerable to further heavy damage during future storms.

The New York State Department of Public Works in conjunction with the Long Island State Park Commission, has awarded contracts and is supervising the construction of these six jetties. The first of them was built at Tennessee Avenue in 1944-45. A contract for the construction of three others at Nevada, Georgia, and Arizona Avenues was awarded to the Edward Acker Co. of Setauket, N.Y., on its low bid of \$262,200; the contract involved supplying and placing 38,000 tons of stone at the three locations. Work on this contract started in September, 1945, with the construction of the temporary wooden trestles on which the cranes were to operate when handling the stone. By October the trestles were well along and stone was being swung in place. Material was purchased from the New York Traprock Co. at Stoneco, N.Y., near Stony Point on the west bank of the Hudson River in the heart of the great traprock deposits.

Delivery of Stone

As contract payments were made on the basis of weight of stone in place, a double check was made on all stone shipped to the project. Trucks that hauled the stone from the quarry to the dock for shipment were weighed both empty and loaded; the difference, or the weight of the stone itself, was recorded. At the delivery point, the barges in which the stone was shipped were

carefully measured when loaded and their position in the water noted, then again later on when they were empty. The computed displacement gave a check to the sum of the individual truck weights. The New York Traprock Co. delivered the stone by tow and barge a distance of about 60 miles to a dock at Inwood at the east end of Jamaica Bay. Insufficient depth of water in Reynolds Channel at Long Beach prevented the delivery of the stone directly to the vicinity of the job. This necessitated a 6-mile haul from dock to trestle, which was handled by the Gerosa Hauling Corp. of the Bronx, N.Y., on a tonnage basis; the firm used a fleet of eight Mack flat-bed trucks carrying from 10 to 12 tons each. Heavier loading was not permitted because of the limited

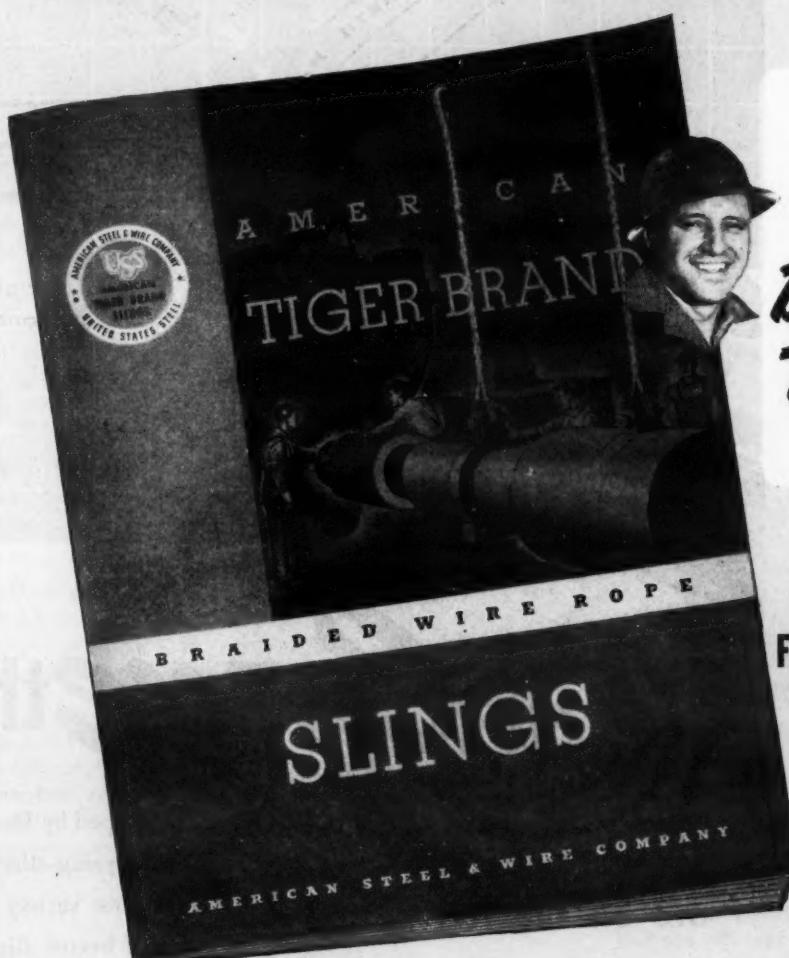


Profile (top) and typical cross section of the rock jetty at Long Beach, L.I.

capacity of the bridge over East Rockaway Inlet on the route to Long Beach. By building up a stockpile of stone,

the contractor could continue work on the jetties until February. At that (Continued on next page)

IMPORTANT NEW CATALOG ON TIGER BRAND BRAIDED WIRE ROPE SLINGS



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The time is here to give new life to snow plows with ANCHOR hydraulic hose replacements. You can depend on our complete stock of hose and couplings for trouble-free operation on those cold winter jobs.

Factory assembled units available 3/16" I.D. to 1 1/2" I.D. inclusive in high pressure, medium pressure, or low pressure constructions.

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C. & E. M. Photos

Left, a Northwest crane with a 50-foot boom and chain and hook rigging lowers Stone into place in the Arizona Avenue jetty, one of the three recently constructed at Long Beach, L. L. Right, a close-up of a 6-ton capstone.

Rock-Jetty System Built at Long Beach

(Continued from preceding page)

time, further barge deliveries of material were discontinued until March because of ice in the Hudson River. Then in the spring the trestles were extended to their full length out into the ocean and the placing of stone was resumed.

Temporary Wooden Trestles

The temporary wooden trestles, from which the cranes worked in handling the stone, were made of 4-pile wood bents with a slight batter on the two outside piles. Pile posts had 12 to 14-inch butts and 6-inch tips, and were 20 to 35 feet long. They were jetted and driven into the sand on 4-foot centers across the bents which were 10 feet apart. Three cranes—a Northwest, a Bucyrus-Erie, and a Koehring—all with 50-foot booms, were on the job either for trestle construction or placing the jetty stone. After being swung into position by the crane, the piles were jetted with a 1-inch nozzle at 70 to 80-pound pressure; water for the operations came from a city fire hydrant and was pumped through a 2½-inch line by a Jaeger 4-inch centrifugal pump. After the piles were worked into the sand by the jet, they were tapped a few times by a ¾-ton drop hammer which was held on the pile by a sleeve since no leads were used. By a combination of the jetting and the 2½-foot drop of the hammer, the piles were driven 10 to 15 feet into the ground.

They were then capped with 12 x 12's, 14 feet long, which were fastened with 24-inch dock spikes. Ten 12 x 12 stringers were laid across the caps to serve as a floor on which the cranes could operate. Only the outside stringers were secured to the caps, as the inner stringers had to be removed when the stone was being placed along the west side of the jetty. A 6 x 6 wheel guard was fastened along each outside stringer as a safety measure for the stone trucks

backing out on the trestle to deliver their loads. The outside stringers were tied to the caps with 26-inch bolts, holes for which were bored by an Ingersoll-Rand air bit driven by an I-R 160-cfm compressor set up on the shore. A 1-inch air line 600 feet long was used

with this unit.

Stone Jetty

The stone jetties extend from 500 to 600 feet out into the water, at right angles to the existing bulkhead along the beach. First step in the jetty construction was the placing of parallel walls of 2 to 8-ton capstones, with a rough side slope of 1 on 1 ¼; the first stone placed was the 6 to 8-ton stone which was set at the toe of the slope. Care was exercised in placing so as to form a compact mass not easily dislodged. Stone that gave evidence of being close to the blast on its removal from the quarry was placed on the inside rather than the outside of the jetty.

In building up these outside walls of capstone the cranes swung the pieces from the trucks by means of a chain and hook. This was disengaged after the stone was in position by dipping the crane boom and then swinging it quickly from side to side. Between these outside walls a space about 8 feet wide was next filled with corestone, the

pieces weighing from 5 to 300 pounds. Thus was formed a relatively tight backbone for the wall, to retain the littoral drift of sand and so increase the width of beach. The corestone was unloaded from the barges by a Marion crane with an orange peel bucket on its 60-foot boom and loaded into stone skips holding from 3 to 3 ½ tons. At the work trestle the cranes dumped these skips along the jetty center line. The Marion crane also loaded the capstone on the flat-bed trucks at the dock. The corestone was built up to an elevation of from 3.0 to 6.0 above a 0.0 elevation of mean low water. It was then topped with a layer of capstone about 3 feet thick consisting of large stones chinked with smaller ones, all carefully placed to create a reasonably smooth top surface.

The top surfaces of the finished jetties are 12 feet wide and are built up to a height of 9 feet above mean low water at the bulkhead on shore. From this point the crown slopes downward to
(Concluded on next page)



It's the *Curve* that does it

... earthmoving costs are lower when Heil Cabledozers are on the job

In addition to proper balance and strength, Heil Cabledozers have that something extra that puts them way ahead in dirt-moving ability. It is the Heil scientifically contoured blade. This specially curved blade, with its reversible cutting edge, was designed and de-

veloped by Heil engineers after studying and analyzing dirt-moving operations under the widest variety of conditions. Its advantages are better digging and rolling action — greater load-handling ability.

Ever-increasing demands from contractors all over the world prove that earthmoving costs are lower when Heil Cabledozers are on the job. Join the long list of satisfied Heil Cabledozers users today. See your International Industrial Power Distributor.

USE RIGHT BUCKET FOR THE JOB

Hayward makes all three—clamshell, electric motor, orange peel. A Hayward recommendation is unbiased.



THE HAYWARD CO., 32-36 Dey St., New York
Hayward Buckets

Heil Cable Scrapers have many unique, cost-cutting features. The bowl design is different. It permits the loading of 15% more material in the same length of time with the same drawbar horsepower — there are no voids. The draft point is located behind and above the cutting blade, for better digging. The digging ability of Heil Cable Scrapers, the larger loads they carry, and their fast dumping action mean greater profits.



THE HEIL CO.
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C. & E. M. Photo
Cranes worked from temporary wooden trestles in placing stone for new rock jetties at Long Beach. Here a Koehring 503 with a 50-foot boom swings a stone for the Nevada Avenue jetty.

Rock-Jetty System Built at Long Beach

(Continued from preceding page)

elevation 7.0 at the 200-foot mark out on the jetty; then it drops to elevation 6.0 at the offshore, or 600 feet out from the bulkhead. The heights of the jetties vary, of course, with the profile of the ocean bottom.

With a crew of 21 men the contractor aimed to place 300 tons of stone in the average day, but this schedule was frequently upset because of storms and high rough seas. When the stone was all in place, the timber falsework superstructure was then removed, and the two west rows of piles outside the stone area were jetted out of the sand and salvaged for future use. Cables were attached to them and a truck winch pulled them ashore. The two east rows of piles were cut off at stone level with a crosscut saw.

Beach Protection

The three jetties in this contract were finished by the end of August, and their solid construction affords a protection that the old wooden jetties could not give. These latter, which were constructed by the City of Long Beach over a period of years, are left in place. They range in length from 50 to 300 feet; they were often torn open by heavy waves and had numerous leaky sections. The new jetties are expected to protect and build up a strip of beach approximately 1 1/4 times their own length. The improvement extends along a 3/4-mile beach front.

Another contract for the construction of two additional jetties at Maryland and Wyoming Avenues was awarded this summer to the same contractor, the Edward Acker Co., on its low bid of \$206,480. This work is now under construction. The six-jetty system, when completed, will bring the same protec-

tion to the western end of the city's shore line as that which has been effected by the existing stone jetties at the central area of the city.

New York State legislation passed in 1945 provides that the State construct the jetties, using money appropriated for that purpose, with half the cost to be borne by the city and repaid within six months after final certification of construction costs.

Personnel

The Edward Acker Co. was represented on this project by Norman Hansen, Superintendent. I. Finklestein was Resident Engineer for the New York State Department of Public Works. District 10 of the Department, which is supervising an extensive beach erosion-control program on the south shore of Long Island, is headed by J. J. Darcy, District Engineer. Sidney Shapiro, Deputy Chief Engineer of the Long Island State Park Commission, acted as consultant in the planning of the erosion control.



C. & E. M. Photo
When the rock for the jetties was in place, the timber falsework was removed and the piles either pulled or cut off at stone level.

Dragline Buckets Shown

Dragline buckets with "automatic" digging action are featured by the Page Engineering Co. in Bulletin 43-B. The 12-page brochure gives details on the

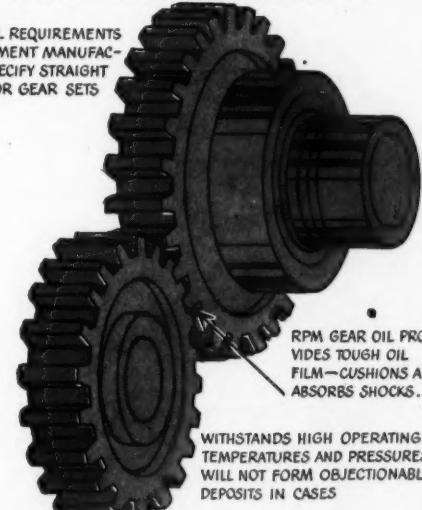
three sizes of buckets which Page builds, the light, medium, and heavy-duty units. Copies of 43-B will be sent on your request. Mention this notice when writing the firm at Clearing Post Office, Chicago 38, Ill.

STANDARD ENGINEERS NOTEBOOK



RPM GEAR OIL IS A HIGHLY STABLE, STRAIGHT MINERAL OIL.

MEETS GENERAL REQUIREMENTS
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RPM GEAR OIL PROVIDES TOUGH OIL
FILM—CUSHIONS AND
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WITNESSES HIGH OPERATING
TEMPERATURES AND PRESSURES—
WILL NOT FORM OBJECTIONABLE
DEPOSITS IN CASES

CONTAINS MOST EFFECTIVE FOAM INHIBITOR KNOWN

Straight mineral oil meets gear-maker requirements

To meet the need for a high quality lubricant for certain transmission gears and other gear sets where a straight mineral oil is recommended, RPM Gear Oil was developed. It is made from the finest paraffinic lubricating oil stocks.

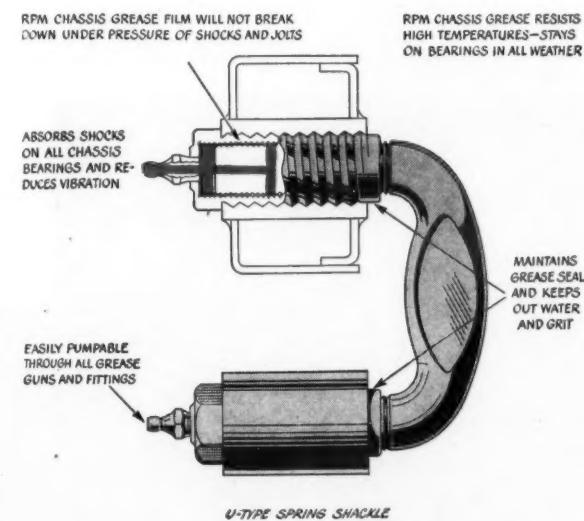
RPM Gear Oil deposits a tough lubricant film on gear teeth and bearings that prevents metal-to-metal contact in all operating conditions. It cools the surfaces and carries away heat. It extends gear and bearing life.

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RPM Gear Oil is made in three viscosity grades: SAE 90, 140, and 250. One of these grades will flow freely over gears and their bearings in every atmospheric temperature condition.

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FOR EVERY NEED A **STANDARD OF CALIFORNIA** JOB-PROVED PRODUCT



THE START. Work at Bluestone Dam near Hinton, W. Va., was begun early in 1942, to control the floodwaters of the New River and the run-off from a drainage area of 4,565 square miles above the dam site. Halted because of the war, construction operations are once more in full swing on this \$11,376,080 contract of the Dravo Corp. In this photo, taken in March, 1942, a Northwest 2½-yard dragline and a D8-pulled Athey wagon are engaged in initial stripping operations.



PILES. To support the six aggregate bins, foundation piles had to be driven. The bins are 40 feet wide at the top, and slope in to a capacity of 375 tons.



AGGREGATE DELIVERY. The six sizes of aggregates are delivered to the contractor's yard by rail and loaded to the aggregate bins by a Lambert electric whirler. From the storage bins, a 700-foot-long conveyor with a 36-inch belt (shown above) delivers the aggregate to the specially designed C. S. Johnson concreting plant, at left.

MOVING CONCRETE. Cars run by dinkies carry 3-yard buckets of concrete to the site of pouring where they are picked up by Dravo whirlers and dumped. Concrete is placed in three stages; a total of 1,000,000 yards will go into Bluestone Dam.



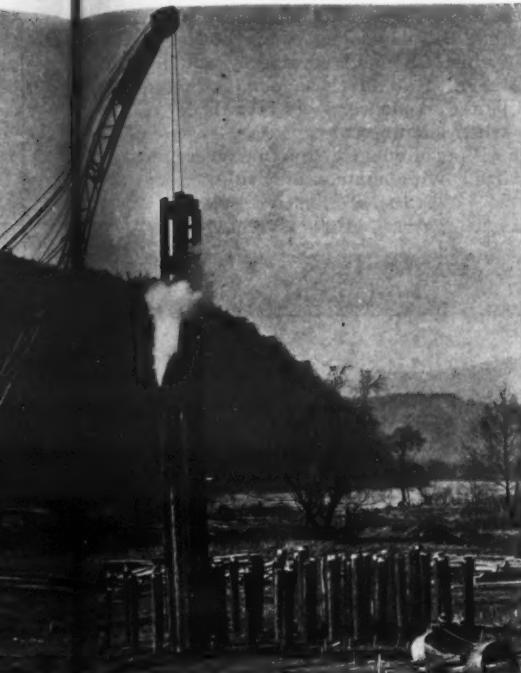
Concreting For Flood-Cont.

Dravo Corp's. Plant at Hinton, W. Va. Is Geared to Handling Six Sizes of Aggregate. It Produces 2,500 Yards of Concrete Daily.

(See article on page 1)

WHIRLERS. The tracks on which the concrete cars run are on a platform supported by concrete blocks in three stages, each 33 feet high, the total height of the dam.





aggregates bins at the contractor's yard, timber
d to be dry. The bins have a total length of 440 feet,
slope in to a conveyor belt at the bottom. Total bin
capacity 2,975 tons.



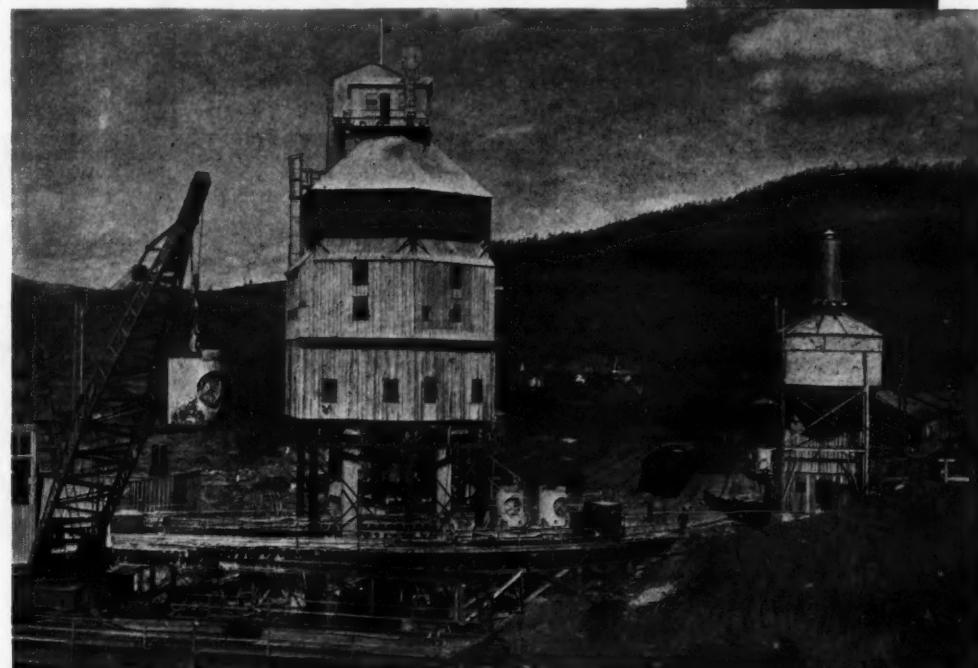
FRAMES. Inverted-V frames for the aggregate bins were fabricated at the carpenter shop, and placed on the timber-pile foundation by a Northwest 95 with a 90-foot boom. Construction of the concreting plant for this flood-control dam was a good-sized project in itself.

Setting Up Flood-Control Dam

U. S. Plant at Bluestone Dam
Is Gated to High Output;
Six Sis of Aggregates, It
Pours 100 Yards of Concrete Daily

(U. S. E. D. Photos)

on which the concrete-placing whirlers operate are laid
firmly on concrete columns 8 feet in diameter. Erected
high, the columns are ultimately incorporated into the dam.



CONCRETE PLANT. The 5-story steel and concrete structure housing the concreting plant has, at the top, batching bins holding 835 tons of aggregate and 802 barrels of cement. Aggregate, cement, and water are correctly proportioned by a Johnson batcher and fed to three 3-yard Koehring tilting mixers which occupy one floor of the plant. The control room is located just above the mixers; all operations are handled by push buttons.

PROGRESS. Nearing the half-way mark, Bluestone Dam rises out of the New River. On completion, this U. S. E. D. flood-control structure will be about 2,060 feet long, and 185 feet high at the non-overflow section. It will impound 631,000 acre-feet of water, creating a reservoir approximately 35 miles long.



Roadside Experiments Test Fertilizer Types

Most Roadside Plants Benefit When Fertilizer That Has High Nitrogen Content Is Used, Ohio Tests Show

• FERTILIZERS that have a high nitrogen content can be used to advantage on roadside plantings, studies recently made in Ohio seem to indicate. Several species of shrubs and evergreens, ground covers, and grass, have been subjected to roadside-fertilization experiments since 1943.

Fostered by the National Joint Committee on Nitrogen Utilization, the tests have been a joint project of the Ohio Agricultural Experiment Station and the State Department of Highways. The national body, sponsored by the Federal government, seeks more extensive uses for nitrogen fertilizers, since it is felt that the element will be plentiful and cheap in the years ahead.

L. C. Chadwick, Associate Professor of Horticulture at Ohio State University and a member of the Joint Committee, reported on the progress of the tests at the Fifth Annual Short Course in Roadside Development held in Columbus early this year. This article sums up Dr. Chadwick's report.

Test Procedure

Grass, sweet clover, Hall's honeysuckle, Amur River privet, border forsythia, jetbead, Chenault coralberry, winged euonymus, winter honeysuckle, hawthorn, redbud, American elm, and black locust were the plants generally found in the test locations.

Five different locations along state highways served as the testing grounds, and afforded passers-by visual demonstration of the work. On each test location three plots were laid out. Each plot was about 750 square feet in area; some included but one type of plant, while others had two or more plant types.

One plot in each trio was left untreated as a check. The second was given its nitrogen in the form of 20 per cent ammonium sulfate at the rate of 20 pounds per 1,000 square feet. Nitrogen in a 10-6-4 form was applied to the third area at 40 pounds per 1,000 square feet. A scarcity of ammonium sulfate forced the substitution of 32 per cent ammonium nitrate in the second year of experimentation, 1944. Each fertilized area thus received equal amounts of nitrogen each fertilization. The initial fertilization took place May 26, 1943.

Notes were made on the condition of all test areas the following August, and the chemicals were reapplied on July 21, 1944. The third application took place May 5, 1945. The condition of each plot was recorded prior to the second and third fertilizations.

Results of the Tests

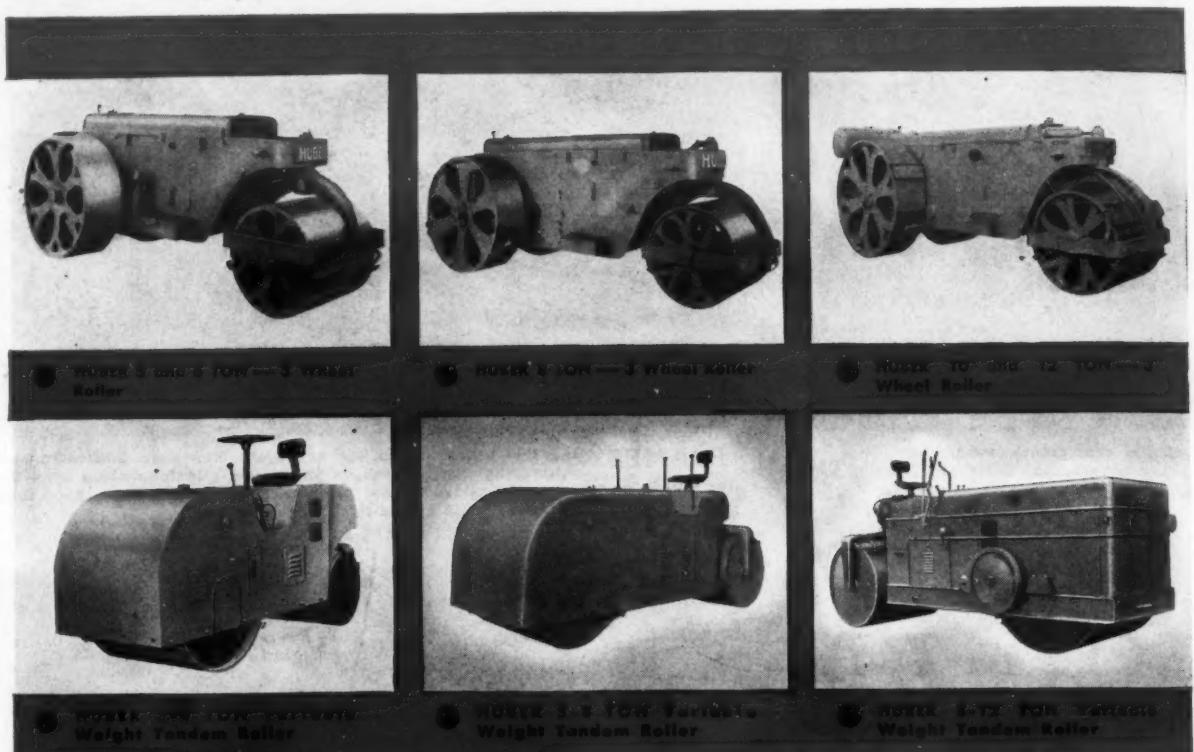
In most cases the nitrogen, when applied as 10-6-4, gave better results than did applications of the ammonium sul-

fate. This was particularly noticeable with grass, Hall's honeysuckle, Amur River privet, and jetbead. The superiority of the 10-6-4 was shown in a more vigorous growth, a greater density, and in some cases a darker green to the foliage. With but few exceptions, the check plots were much poorer, exhibiting weak growth and yellow foliage.

Sweet clover, winter honeysuckle, American elm, and black locust showed little difference between their reactions to the 10-6-4 and their reactions to the ammonium sulfate. The 10-6-4 was generally somewhat more effective, but both treatments resulted in much better growth than that in the untreated sections. On the other hand, ammonium

sulfate gave results slightly superior to the 10-6-4 when used on border forsythia, Chenault coralberry and hawthorn. But all these plants showed a better response when fertilized than when left untreated.

Plots of winged euonymus were fertilized with ammonium sulfates only. (Concluded on next page)



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- Hydraulic steering, quick and easy.
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needs, has built just such a line of 3 wheel and tandem rollers.

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Roadside Experiments Test Fertilizer Types

(Continued from preceding page)

One was treated at the rate of 20 pounds per 1,000 square feet, the other at 40 pounds. Growth was good in both, but the foliage appeared a darker green on the plants receiving the greater concentration. The check-plot plants showed poor growth and yellow foliage.

Responses to fertilizer treatment will vary with soil structure, rainfall, and the plants in the plot, Dr. Chadwick remarks, but in many cases the use of nitrogen will result in quicker establishment, a more rapid growth, and a more attractive plant.

Specific Findings

Composite findings on some of the five locations were as follows:

On the first location, 10-6-4 was best on the grass; ammonium sulfate was best with the hawthorn, its growth doubling that of the check plot. In each case the second area was "good" and the check "poor". Austrian pine on the three plots in the same location showed little difference in general appearance. The tree fertilized with 10-6-4 had the greatest side and tip growth. Hall's honeysuckle and sweet clover, also in the same location, showed good growth and best appearance with 10-6-4; with ammonium sulfate, "good to fair growth", but the check area was "poor". Grass and winter honeysuckle in the same neighborhood: 10-6-4 again was best on grass, while the honeysuckle remained generally the same in all three sections, favoring ammonium sulfate slightly.

In another section of the state, Amur River privet and jetbead were given the three-plot test. Very good growth resulted in plants given the 10-6-4, while the ammonium sulfate was good but not as good. The check plots were poor by comparison.

Two sections of a third location had Hall's honeysuckle. One, planted also with grass, showed little difference in the honeysuckle though the grass grew well in the 10-6-4 plot. The other, combining honeysuckle and black locust, produced a much greener, thicker, and more extensive growth of honeysuckle in the 10-6-4. The black locust, too, was slightly better in the 10-6-4. In both cases the check plot was poor.

The scientists fertilized small redbud with 1½ pounds of ammonium sulfate on another location. All plants showed a poor response to the fertilizer treatment, and were in poor condition in the check plot also. Border forsythia and coralberry favored ammonium sulfate over the 10-6-4 by a small margin. Both growths were better than in the untreated area.

The 10-6-4 nosed out ammonium sulfate in the tests on American elms. Trees with 4-inch diameters were fertilized with 5 pounds of the ammonium product, and those having 6-inch girths with 15 pounds of 10-6-4. Both treatments produced better results than the natural growth in the check area.

High-Pressure Pump For Jetting Duties

A jetting pump for bridge and dock construction has been announced by Porto-Pump, Inc. The unit is said to deliver more than 43 gallons a minute at 100-pound pressure, and over 40 gallons at 120 pounds. It has a 31-foot suction lift, and a maximum pressure of 165 psi. It can be mounted on mobile equipment.

Rubber impellers that expand longitudinally under pressure reduce abrasion and water loss by leakage. A bypass valve facilitates starting the pump.

against a head of water. The open valve lowers pressure, as desired, and allows hose to be added or nozzle to be changed while operating. The power source, a single-cylinder air-cooled engine, delivers 5 hp. Pump and engine are mounted together, and coupled by a splined sleeve.

Porto-Pump is described in literature available from the manufacturer. Mention this news item when writing Porto-Pump, Inc., 227 Iron St., Detroit, Mich.

Equipment for Tractors

Construction equipment for use with Caterpillar tractors is pictured by the Hyster Co. in a 36-page catalog. It describes towing winches, tractor donkeys, utility and worm-drive winches, tractor cranes, and the Hystaway, a combination crane, dragline, and clamshell for mounting on a tractor.

Mention of this notice on a card to the Hyster Co. at 2952 N.E. Clackamas, Portland 8, Oreg., will bring your copy of Catalog 20.

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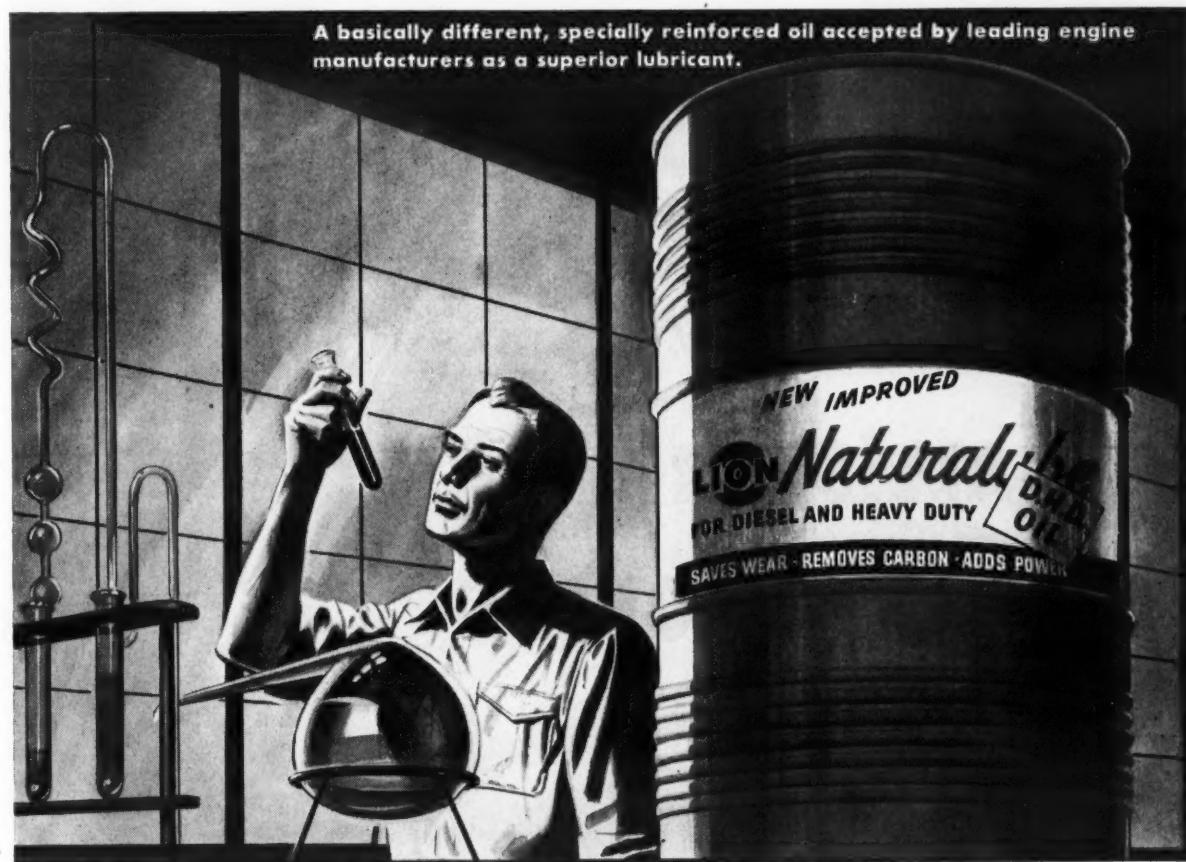
NOW is the time to prepare plans for your Federal Aid Secondary Road Program. We'll be glad to work with you in drawing up specifications. Write for booklets, "Calcium Chloride Consolidated Roads," and "Better Bases for Better Surfaces." Address Dept. 94-10.

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able it to remove hard carbon... greater ability to penetrate to all moving parts of an engine and adhere to those parts even when engines are idle...and non-corrosiveness.

Ask your local Naturalube distributor about D. H. D. or write direct to Lion Oil Company, El Dorado, Arkansas.

For normal service, where D. H. D. is not required, use Naturalube Motor Oil (not so heavily reinforced).

Naturalube D. H. D. is supported by a positive money-back guarantee of satisfaction. If you don't believe it is the best oil you've ever used, Lion Oil Company will return your money.



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ARKANSAS

Most States Approve PRA Highway-Integration Plan

The integrated national interstate-highway system suggested by the Public Roads Administration has been approved by 39 states and the District of Columbia. Early agreement with the remainder is expected, Commissioner Thomas H. MacDonald reports.

The development of a 40,000-mile interstate-highway system was authorized in 1944, and the states were asked to recommend routes for inclusion in the system. PRA reviewed these recommended routes, then offered a tenta-

tive integration of the system for state consideration.

The system as proposed by PRA covers 37,170 miles of routes between and across cities. It does not include circumferential and distributing routes in urban areas; these will be selected later from the 2,830-mile balance. The interstate system automatically becomes part of the Federal-Aid highway network and is eligible for F-A expenditures.

Of the nine states which have not yet accepted PRA's suggestions, five have not responded; three accept a portion of the integration, two of them giving

no alternative proposals for rejected parts, and the third proposing additional mileage; the remaining state accepts the entire proposal but wants to add more routes.

New Electric-Parts Firm

Organized by Bert E. Holub, who was formerly General Sales Manager for Ideal Industries, Holub Industries, Inc., has begun the manufacture of electrical and mechanical products at Sycamore, Ill. Mr. Holub's assistant at Ideal, Gordon W. Wetzel, has become Sales Manager for the new firm.

Road-Building Equipment

The White Mfg. Co. of 1227 W. Beardsley Ave., Elkhart, Ind., has listed all its various road-construction and maintenance machinery in a 16-page catalog, No. 32-B. Highway authorities and contractors can obtain it on mention of this notice.

Traffic-line markers, material driers, pavement-repair trucks, asphalt plants, concrete vibrators, tar kettles, tractor loaders, heaters, oil burners, kerosene torches, and many other items are pictured and described in the booklet. Specifications are given.



ALL-STAR EARTHMOVING TEAM



On a big levee-enlarging contract near Turrell, Arkansas, Stacy McAdams is moving a lot of yardage in a hurry with an all-star "Caterpillar" Zoned Equipment set-up.

The equipment he uses includes one of the early types built by "Caterpillar"—a No. 48 Elevating Grader—and some of the newest—five "Caterpillar" Diesel DW10 Tractors with W10 Wagons. In addition, he has a "Caterpillar" Diesel D8 to pull the Elevating Grader; a D7 and a D6, equipped with bulldozers; and a No. 11 Motor Grader for finishing.

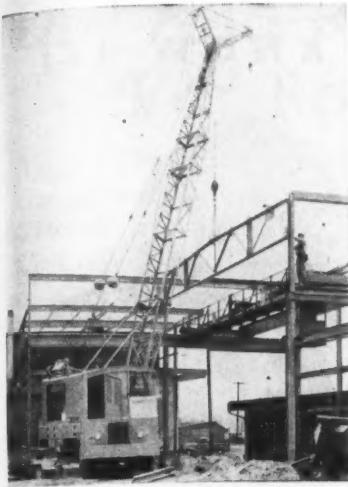
Those fast-stepping "Caterpillar" Diesel DW10s can make up to 18 miles per hour on long hauls to the fill. Their 5-speed transmission hauls the load surely up steep grades, and finger-tip hydraulic steering makes it easy to put the earth exactly where it's wanted.

Built to handle the toughest jobs in their field, and backed by sure, efficient dealer service, "Caterpillar" Diesel Earthmoving Equipment has no equal for "lowest costs on earth."

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR DIESEL

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT



The new Koehring 304 truck crane, with boom lengths up to 110 feet, can lift up to 15,800 pounds without outriggers, or 40,000 pounds with outriggers.

New Truck Crane

Designed for easy handling on street or highway, the new Koehring 304 truck crane is said to reduce unproductive job-to-job moving time to a minimum. The new unit is the same basic machine as the Koehring 304 crawler model. Extra strength regularly built into it has made it possible to turn the extra stability gained by truck mounting into extra lifting capacity, the manufacturer says.

The Koehring 304 has a lifting capacity of 40,000 pounds with outriggers, and of 15,800 pounds without outriggers. Both are 85 per cent ratings. The hinged boom folds easily, to save time when the machine is moved. Pendant boom suspension simplifies changes in boom length. Booms are available in lengths up to 110 feet, with jib-boom extensions in 15 to 30-foot sizes. Optional removable outriggers permit operation of the unit as a shovel or dragline.

Interested contractors and state and county highway engineers may secure further details direct from the Koehring Co., 3026 W. Concordia Ave., Milwaukee 10, Wis.

New Pyrometer Kits

Two new portable pyrometer kits have been introduced by the Wheelco Instruments Co., 847 W. Harrison St., Chicago 7, Ill. One is an extension-type pyrometer designed to permit a choice of plug-in angle extensions where a number of applications necessitate a universal instrument for measuring and checking temperatures with different kinds of thermocouples.

The other kit features a straight-type extension with an adapter for an Iron-Constantan surface thermocouple, and an assortment of thermocouples. An additional adapter is furnished for use with bare and prong thermocouple tips. Details about either kit can be secured from the above address on mention of this story.

Wickwire Moves Offices

The bringing together of its top sales and production officials in one location, Buffalo, N. Y., has been announced by Wickwire Spencer Steel, Division of the Colorado Fuel & Iron Corp. The new location is 361 Delaware Ave., Buffalo 2.

A. G. Bussman, Vice President, and H. C. Allington, Assistant General Sales Manager, have moved from New York City to Buffalo, as have the Market Research and Advertising Departments, and the general office of the Wire Department.

Wickwire's Wire Rope Department has been established at the Palmer, Mass., plant. Percy Jenkins, Hardware Products Sales Manager, will also serve as the firm's Eastern District Manager, with offices at 500 Fifth Ave., New York 18 N. Y.

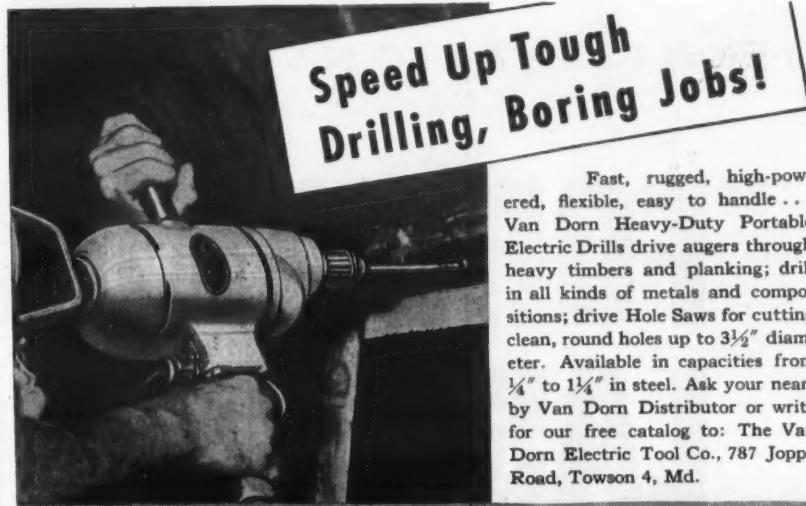
Concrete Handling

Those who handle concrete will be interested in a 24-page catalog issued by Garlinghouse Bros. The firm makes an extensive line of concrete hoppers, buckets, barrows, and carts, all of which are illustrated and described in the brochure. Copies of Catalog 70 will be sent on request. Write Garlinghouse at 2416 E. 16th St., Los Angeles 21, Calif. Mention this report.

New C. I. T. Office

The opening of a regional office at 223 Peachtree St., N.E., Atlanta, Ga., has been announced by C. I. T. Corp., of New York City, specialist in industrial financing. Edward H. Mayer, Assistant Vice President, will be in charge.

In line with the policy of the company, this new office will make available to clients in the southeast modern financing services to expedite the purchase and sale of all types of industrial and construction equipment.



Fast, rugged, high-powered, flexible, easy to handle . . . Van Dorn Heavy-Duty Portable Electric Drills drive augers through heavy timbers and planking; drill in all kinds of metals and compositions; drive Hole Saws for cutting clean, round holes up to 3 1/2" diameter. Available in capacities from 1/4" to 1 1/4" in steel. Ask your nearby Van Dorn Distributor or write for our free catalog to: The Van Dorn Electric Tool Co., 787 Joppa Road, Towson 4, Md.

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PORTABLE ELECTRIC TOOLS



ANYWHERE WITH SCHRAMM AIR COMPRESSORS!

Construction work indoors, outdoors, on land, on water . . . anywhere . . . Schramm Air Compressors are sturdy enough, compact and lightweight enough, to give you all the compressed air you want!

The construction field likes these Schramm features: 100% watercooled, permitting running with hood "on"; forced feed lubrication; mechanical intake valve; easy to move about on the job!

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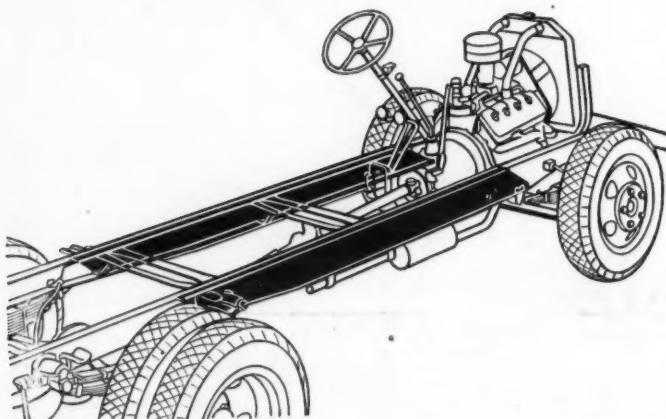
SCHRAMM INC.

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"FORD TRUCKS LAST LONGER!"

One big reason—
FORD FRAMES STAND UP!



One of the big reasons why 78 per cent of all Ford V-8 Trucks ever built are still in use, is found in Ford frame engineering. Ford Light Duty Half-Ton units, for instance, have true *truck* frames—parallel side-rails—full SAE 34-inch width, taking standard bodies—rear kick-up and side-mounted springs for extra-low load height—alligator jaw cross-member—great strength and rigidity, for longer life to cab and body. The full-channel side-rails of Heavy Duty frames are *doubled* between springs, as illustrated, increasing side-rail strength 46 per cent—a construction far superior to old-fashioned fishplates.



Ford 134-inch wheelbase Heavy Duty Truck, with Thornton drive and 4-6 cubic yard Dump body by Anthony Co., Streator, Ill.



Only Ford offers all these long-life features: choice of 2 great engines, the 100-H.P. V-8 or the 90-H.P. Six—Flightlight aluminum alloy, 4-ring pistons—short, rigid, fully counterbalanced cast alloy steel crankshaft—big brakes, with non-warping, score-resistant cast drum surfaces—extra heavy sheet steel in fenders, hood, cowl and cab—4-pinion differential with triple roller bearing, straddle-mounted axle drive pinion.

There are *more than fifty* such examples of Ford endur-

ance-engineering in today's Ford Truck. NO OTHER TRUCK BRINGS YOU ALL THESE IMPORTANT EXTRA VALUES AT ANY PRICE. Each one adds to the years of faithful service you can confidently expect from your Ford Truck. Let your Ford Dealer point them out to you and explain their importance.

FORD TRUCKS

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Dirt and Rock Moved For Road Relocation

A 0.6-Mile Project Erases Hazardous Curve; 6-Inch Gravel Base Course for 2½-Inch Macadam Surface

MODERN road building in this country is a comparatively new industry. When many of our highways were first laid out, economy was usually the ruling factor, with safety often relegated to secondary consideration. High-speed motoring was not known then, and roads were generally curved around such obstacles as rocky hillsides rather than sent through them by drilling and blasting. In this way more road mileage was obtained with the highway dollar. Today, however, these early roads with their sharp-curved alignment are a menace to cars traveling at what is now the accepted speed of modern traffic. The State Highway Department of Connecticut, fully cognizant of the fact that portions of these early roads must be rebuilt in the interests of safety, is eliminating many dangerous locations in its highway system.

A particularly bad spot on State Route 12 near Ledyard in eastern Connecticut was improved this summer. The 0.6-mile relocation eliminates a sharp reverse bend known as Deadman's Curve, a scene of many accidents in the past. A contract for this work was awarded by the Department to the Campanella & Cardi Construction Co. of Providence, R.I., on its low bid of \$89,466.33. Grading was begun on March 25. The new alignment went through some heavy rock cuts involving the removal of 20,000 yards of this material, as well as 29,000 yards of earth.

Rock Excavation

For rock drilling the contractor used two wagon drills, an Ingersoll-Rand and a Chicago Pneumatic, each driven by a Schramm 315-cfm air compressor. Drilling was a tedious process because of the seamy structure of the hard granite, and the many mud pockets which caused the drills to clog. Because of these factors, 3-inch bits were usually employed at the start of the drilling on 4-foot lengths of 1½-inch drill steel. The length of the steel was gradually increased in multiples of two up to 12 feet, and then in 4-foot jumps to a maximum of 20 feet. The size of the bits decreased correspondingly to a minimum of 1¼ inches. The average lifts in the rock cuts, however, ranged from 12 to 15 feet.

Du Pont 40 per cent dynamite, in 1¼ x 8-inch sticks, was used in the blasting. In the deep 20-foot holes, from a half to a full case or 25 to 50 pounds was placed at the bottom and then filled and tamped nearly to the surface, when a couple of additional half-pound sticks were added for the purpose of heaving the charge. In this way very little secondary blasting was required. Any necessary boulder drilling was done by a Cleveland jack-hammer using a 1¼-inch bit with 4-foot length of drill steel; air was furnished by a Schramm 105-cfm portable compressor. On the 5 to 7-foot shallow ledges, when crossed by many seams, usually 3 to 4 sticks were sufficient to a hole. As many as 60 holes were shot at a time.

Three shovels were on the job at various times—a Lorain 77 1½-yard, and two Link-Belt Speeders 1¾ and ¾-yard. In the hauling, which averaged about 1,000 feet, nine 7-ton trucks were employed—4 Autocars, 4 Macks, and a Sterling. At the center of the job was a deep gully where an 8 x 8 x 203-foot reinforced-concrete box culvert was constructed. On top of this went

a 35-foot fill. Not enough material was available on the project to complete this fill, so 9,000 yards of material was obtained from two borrow pits. This required hauls of 600 and 1,700 feet respectively. Material on the fills was spread in 12-inch layers by two Caterpillar D7 tractor-dozers which, together with the movement of the heavy trucks, furnished the necessary compaction.

On the 320-yard culvert pour, concrete was purchased from the Southern New England Contractors Supply Co. of Pequonock, Conn., and was transported to the job in three Jaeger 4-yard mixers mounted on Mack trucks. The water was added to the batch after the

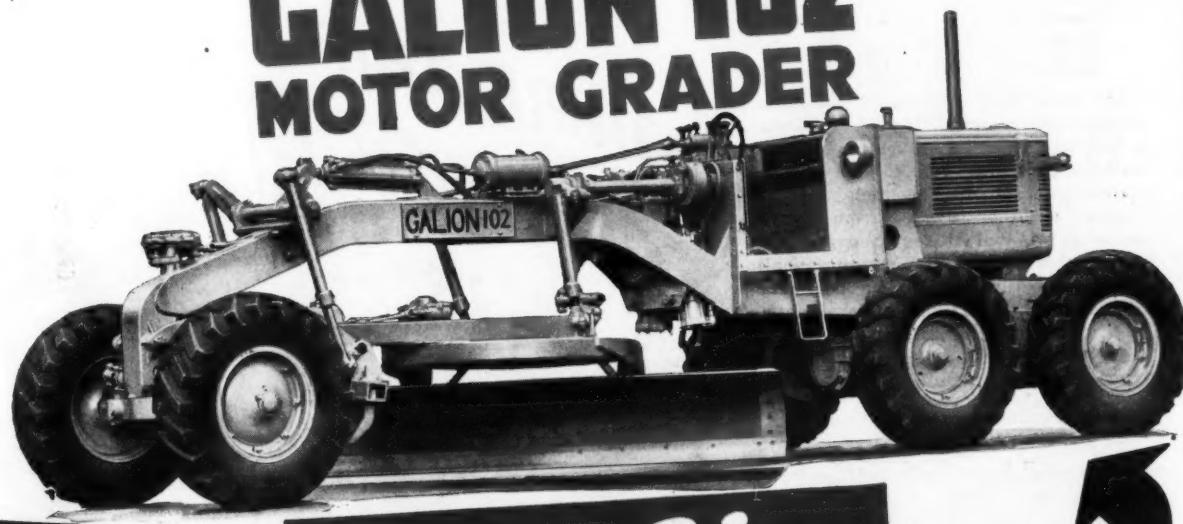


C. & E. M. Photo
In an earth cut on the Campanella & Cardi highway relocation job on State Route 12 in Connecticut, a Lorain 77 1½-yard shovel loads a 7-ton Autocar truck.

trucks reached the job, and mixed just before placing in the forms. The truck-mixers were the contractor's equipment.

The culvert was poured in 40-yard sections. Reinforcing steel was shipped
(Concluded on next page)

GALION 102 MOTOR GRADER



**Same Size
Tires REAR**

FRONT

Both ends of a Motor Grader are important—that's why on the GALION 102 all six wheels and tires are the same size.

Better Performance Because—

- More ground contact and larger anti-skid tread gives greater stability for all operations of the grader.
- Decreases front end slippage on bank or shoulder work.
- Better flotation on soft material.
- Economy and convenience of a single tire size.
- Less shock and wear on machine and operator.
- Permits faster speed when traveling.
- Moves more material with less power.

Write for complete information and name of nearest GALION Distributor.

GALION FEATURES THAT ASSURE TOP PERFORMANCE

1. Large front tires.
2. Combination hand and hydraulic steering.
3. Rugged box type main frame.
4. Gear type, four-wheel tandem drive.
5. Full hydraulic control—low pressure system.
6. Heavy front axle construction.
7. Blade pressure of 13,500 lbs.
8. Powerful full diesel motor.

The GALION IRON WORKS & MANUFACTURING CO.

General and Export Sales Offices

Galion, Ohio, U. S. A.

GALION
IRON WORKS
GRADERS • ROLLERS

Dirt and Rock Removed For Road Relocation

(Continued from preceding page)

to Groton via the New Haven railroad from the Sparrows Point, Md., plant of the Bethlehem Steel Co. and hauled by truck the remaining 8 miles to the job.

Macadam Roadway

The new roadway consists of a gravel base course 23 feet wide and 6 inches deep with 10-foot shoulders in the cuts and 8-foot shoulders in the fills. In the fills the slopes are $1\frac{1}{2}$ to 1, while in the cuts the earth slopes are 2 to 1 and the rock slopes are 1 to 2. The shoulders are also of gravel, put down in two 4-inch courses. The processed gravel used in the base course was bought from the Southern New England Contractors Supply Co. and was washed and graded at the Pequonock plant to conform to the following specifications:

Sieve Size	Per Cent Passing
2 $\frac{1}{2}$ -inch	100
3 $\frac{1}{4}$ -inch	60-75
3 $\frac{1}{2}$ -inch	balance

On top of the gravel base a macadam surface course was laid 22 feet wide, a foot less than the base in width in order to prevent raveling. The surface course consists of a $2\frac{1}{2}$ -inch layer of crushed traprock, graded from 2-inch stone down, which was then given a penetration of Socony Vacuum asphalt followed by a bituminous seal coat furnished by G. A. Winter of Providence, R. I. Work on the paving got under way in August and the contract was completed in September.

Quantities and Personnel

The major items on this 0.6-mile road-improvement contract included:

Earth excavation	29,000 cu. yds.
Rock excavation	20,000 cu. yds.
Borrow material	9,000 cu. yds.
Processed-gravel base course	2,615 tons
Crushed-stone surface course	1,090 tons
Bituminous material	24,664 gals.
Class A concrete	320 cu. yds.
Reinforcing-steel	53,229 lbs.
Perforated underdrain, 6-inch	1,490 lin. ft.

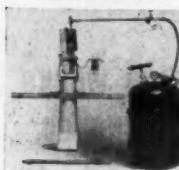
For Campanella & Cardi Construction Co., William Robertshaw was Superintendent, directing the activities of a force of from 35 to 40 men working a 53-hour week. Valvoline fuel, oil, and lubricants were used in the equipment. L. L. Benton was Inspector for the

Get Ready for Winter with HAUCK THAWING OUTFITS



Oil Burning

Single and double burner units, complete with tank, provide time saving, high speed, intense flame for thawing, drying and melting in construction and maintenance.



CONCRETE HEATERS

For non-filt drum mixers of 5 to 28 cu. ft. capacity; fires right into drum. Also removable for general thawing. Recommended by Portland Cement Association.

Also ask about Hauck Steam Thawers, Water Heaters, Salamanders, Ground Thawers, Lead Melting Furnaces, Tar Kettles, etc.

HAUCK MANUFACTURING CO.
116-126 Tenth St.
Brooklyn 15, N. Y.



C. & E. M. Photo
About 20,000 cubic yards of rock excavation was involved in realigning 0.6 mile of Conn. State Route 12. Here a 1 $\frac{1}{4}$ -yard Link-Belt Speeder is shown loading blasted rock to a 7-ton Sterling truck.

Connecticut State Highway Department, which is headed by William J. Cox, Commissioner, with Arthur W.

Bushell as Chief Engineer, and Leslie G. Sumner, Director of Engineering and Construction. The project was

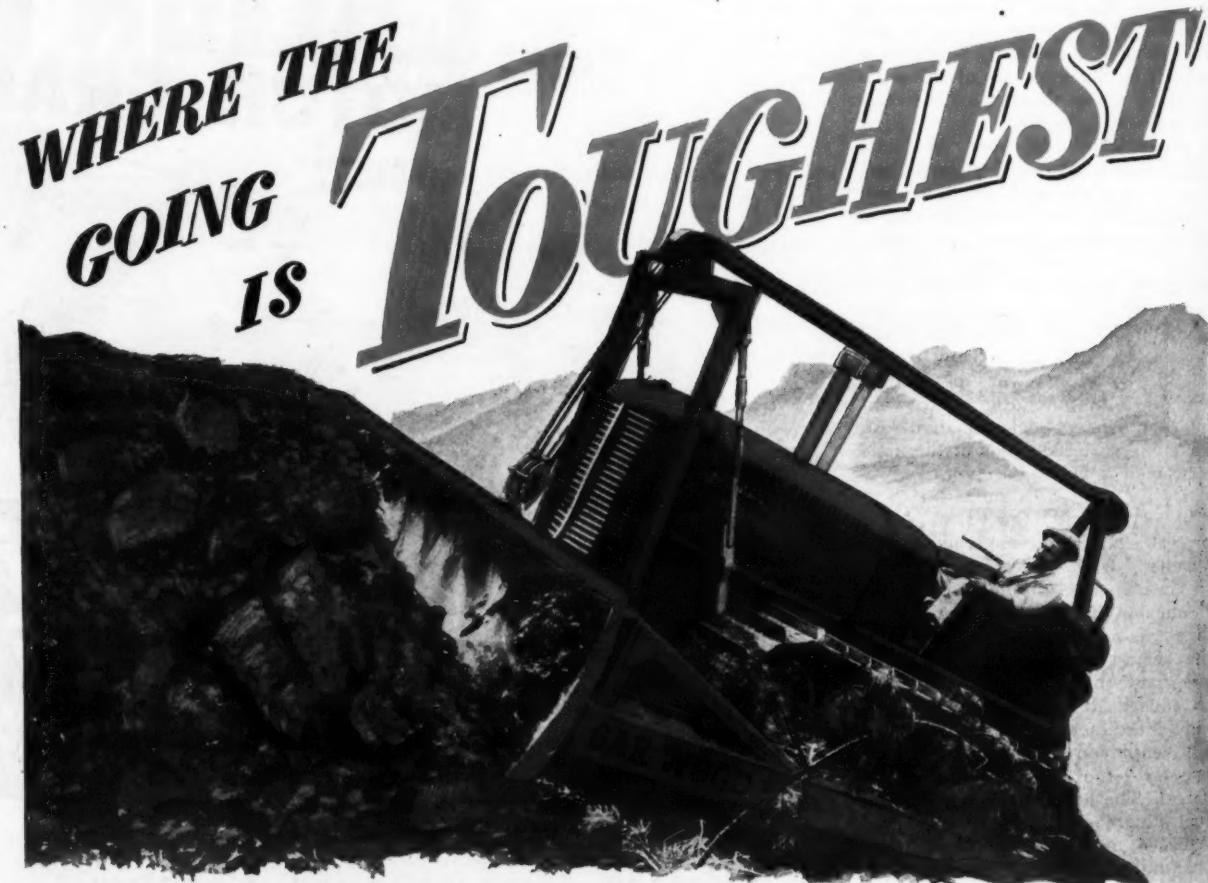
under the general supervision of L. H. Beebe, Resident Engineer.

Gravel-Pit Equipment

Machinery for aggregate production is shown in a catalog issued recently by Pioneer Engineering Works. Jaw and roll crushers, feeders of various types, conveyors, screens, dehydrators, and allied items are featured in the 16-page presentation. Copies can be obtained on mention of this notice. Write Pioneer at 1515 Central Ave., Minneapolis 13, Minn.

New Davey Engineer

The appointment of Ernest S. Theiss as Assistant Chief Engineer has been announced by the Davey Compressor Co., Kent, Ohio. Mr. Theiss has taught mechanical engineering at the College of Engineering, Duke University, and was formerly secretary of the American Society of Mechanical Engineers, Region IV.



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In use everywhere for clearing, leveling, grading, and excavating...All Gar Wood Road Machinery is specifically designed, engineered, and built to make the toughest jobs easy...and more profitable.

That's a fact...for Gar Wood

Bulldozers and Dozecasters are the

result of practical, down-to-earth engineering. They're constantly being proven and reproven in the field...in mining, quarrying, lumbering, railroading, and general contracting.

Moving the four corners of the earth, rebuilding a war-torn world, Gar Wood Road Machinery has got to be good. For your next job...particularly if it's a tough one...specify Gar Wood.

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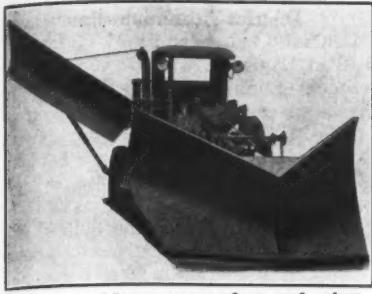
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The new Adams snow plow and wing are designed for use with its new line of high-arch-axle graders.

Plow and Wing Equip Grader to Fight Snow

A new and improved snow plow and wing combination has been announced by the J. D. Adams Mfg. Co., 217 So. Belmont Ave., Indianapolis 6, Ind. Somewhat similar to older Adams snow-fighting equipment, the new units are adapted to the firm's new line of high-arch-axle motor graders.

Fast action through a high-lift curvature marks the V-plow, Adams says. Weighing somewhat over 2,400 pounds with lift frame and controls, the plow has an 8½-foot-wide front cutting edge and an 11-foot-wide rear cut. It is 3½ feet high at V-point, and 6 feet 2 inches high at the V-tips. Welded box construction reinforces the 3/16-inch steel plate at the sides and front.

The snow wing attaches to the side of the grader's frame, and gets its angular thrust from a telescopic pipe mounted to the rear. It is built in two sizes, the 12-foot length for use with models 414 and 512, and the 9-foot model for graders 305 and 312.

Used without the wing, the V-plow is operated by the controls ordinarily used for the scarifier or front leaning wheels. When plow and wing are used together they operate from an auxiliary power box mounted on the frame cross beam. Separate levers control the plow and the inner and outer ends of the wing. Optional equipment for use with Adams graders in snow work includes special white, blue, and amber lights.

You can secure full details about these additions to the Adams line by writing the firm at the above address. Mention this news item.

New Hydraulic Unit Aids Truck Steering

A wartime development of the Bendix Products Division of the Bendix Aviation Corp. is now being installed on heavy automotive equipment. The unit, a hydraulic device for power steering, supplements physical effort, and provides a number of safety factors, Bendix says.

Though it is hardly a practicable installation on vehicles now in use, this device is being incorporated in new trucks, graders, and other units. With the new development, hydraulic power does the heavy work in steering. The device has a self-righting action for turns, and it opposes road shock automatically. Normal force on the steering wheel can turn the front wheels from one extreme position to the other while the truck is motionless, Bendix says. This feature also makes for easy maneuvering in close places.

The Bendix power-steering device consists essentially of a hydraulic power cylinder and control valve which are incorporated into the design of a conventional steering gear. Whenever the effort at the steering wheel exceeds the pre-load of the control-valve centering springs, the hydraulic system comes into operation and relieves the driver of the need for exerting excessive force.

To secure further details about this new aid to truck operation and about its installation in construction machinery, write the Bendix Products Division, 401 Bendix Drive, South Bend 20, Ind.

Diesel Uses Rhymed

The role that compact high-speed diesel engines are playing in our everyday lives is described in a novel booklet issued by the Detroit Diesel Engine Division of General Motors. Written and illustrated by the Division's Product News Manager, the pocket-size booklet is in verse form. It is an answer to the question "What do GM diesels do?", put to the official by his young son.

Copies of this booklet can be secured from the Detroit Diesel Engine Division, General Motors Corp., Detroit 23, Mich. Just mention CONTRACTORS AND ENGINEERS MONTHLY.

Rubber Firm's New Plant

The Seiberling Rubber Co. has acquired a former war plant at Garland, Texas, and expects to have it in production by October, 1947. It will manufacture tires and tubes exclusively. The plant has 260,000 square feet of floor

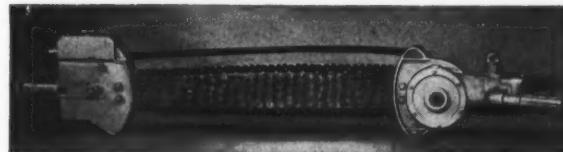
space, and will employ about 1,200 people.

Folding-Sawhorse Data

A folding sawhorse made by the Unique Tool Products Co. is described

in a leaflet available from the firm on request. An 8 x 9 x 42-inch bundle for transporting, the horse opens to standard size with a 9 x 36-inch shelf. Unique is located at 4636 No. Clark St., Chicago 40, Ill. Say you read this notice, when writing for the leaflet.

Investigate this modern power tool



For clearing and cutting timbers and piles with speed and accuracy, this modern power tool is just what you need—especially designed to meet post-war construction requirements. Pneumatic model illustrated. Gas and electric models available also.

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- PULLSHOVEL
- DRAGLINE
- CLAMSHELL

• FRONTS, BOTTOMS, SCOOPS and TEETH are 14% manganese steel developing tensile strength up to 120,000 p. s. i. This high percentage manganese steel gives tough, rugged strength for hard service and allows wide set corner teeth for easy entrance in digging. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

Experience Counts

See your shovel man or equipment dealer about PMCO Buckets and Dippers.

On the ½ yd. and ¾ yd. Shovel, Pullshovel, and Dragline Buckets, all teeth are interchangeable—*a great advantage to operators.*

Clamshell
Sizes ⅓, ½, ¾, 1, 1½, 2 yds.

Pullshovel
Sizes ⅓, ½ and ¾ yd.

Dragline
Sizes ⅓, ½, ¾, 1, 1½, 2, 2½ yds.

Shovel
Sizes ⅓ to 18 yds.

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WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES.



Better Road Repair On a Small Budget

That Is the Motto of This State Highway District Which Maintains 409 Miles In Sparsely Populated Area

IN 1932 a vacation trip to Glacier National Park was a nightmare of gravel and dirt roads. Today you can drive on asphalt at 60 miles an hour. In the decade from 1932 to 1942 the nation's third largest state paved 5,000 miles of its highway system. The maintenance of that system is today one of the important jobs of the Highway Department.

Montana is the state, the land of great plains and shining mountains. Its 146,997-square-mile area is bigger than Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, and Maryland combined! Its population density is only 3.8 persons to the square mile, so native automobile traffic and revenue are not heavy. But the constant raising of highway engineering standards to meet contemporary traffic demands has had to go on despite the low budget.

Increasing tourist travel has aggravated the maintenance problem. Registration of automobiles is on the increase. Roads that were built for light travel are now getting heavier counts. The state is so large and the road-building and maintenance revenue so limited that Montana had to spread her funds out thin to pave as many miles as possible. The result is a 5,000-mile system of road-mixed paving. It is as good a riding surface as you will find anywhere in the country, but local conditions make maintenance a tough job in anybody's language.

Montana is now divided into ten construction-maintenance districts for efficient operation, each district headed by a district engineer responsible only to highway-department headquarters at Helena.

Of these districts, one of the toughest maintenance jobs of them all is the battle in District 6, with its office and shop at Kalispell. District 6 is in the far northwestern corner of Montana, near



C. & E. M. Photo

General headquarters for District 6 of the Montana State Highway Department is located in this combined administration building and shop in Kalispell.

the Canadian line. It fights the wear induced by a flood of summer tourist traffic pouring down Highway 2 from Glacier National Park, Banff and Lake Louise, and Yellowstone National Park. District 6 also fights ice and snow, light glacial soil with tricky characteristics, a working season that coincides exactly with the period of heaviest automobile travel, and a shortage of equipment.

The district includes all of Lincoln

and Flathead Counties, the north end of Lake County, and 12 miles in Glacier County. Altogether it maintains 409 miles, including 316.4 miles of oil-treated pavement, 70.7 miles of improved gravel, and only 20.9 miles of unsurfaced roads. The district is partly in agricultural country on the west slope of the Continental Divide, but many a mile of its system is up on the Rocky Mountains at an elevation of 5,500 feet.

District Administration

District 6 is headed by M. C. Lockey, District Engineer, with Resident Maintenance Engineer Ray Spurzem in charge of road and equipment upkeep. During the war, when Mr. Lockey was away in service, his job was held by Spurzem.

Spurzem supervises the work of fifteen section men, with the help of one district maintenance foreman who acts as a coordinator. Each section man patrols and repairs from 25 to 30 miles of highway. Each has from one to four men, several dump trucks for hauling various materials, a motor grader, and a 400-to-600-gallon distributor for spraying bitumen.

Spurzem also runs a maintenance shop and yard at Kalispell headquarters, with a district mechanic and four mechanics to repair all types of equipment. The shortage of parts is now worse than it was during the war.

An extra gang with four dump trucks and a Lorain $\frac{3}{4}$ -yard shovel work over

(Continued on next page)

**Handle that road oiling contract
more profitably with a
Cleaver-Brooks Tank Car Heater**



The quicker you get the oil or asphalt in the tank car on the siding up to application temperature and flowing into the distributors—the faster your road crews can get going and finish the job.

With a Cleaver-Brooks Tank Car Heater you can have hot, dry steam flowing to car coils from a cold start in 20 minutes or less. And you can keep going all day with the least work and bother because a Cleaver-Brooks Tank Car Heater requires less fuel and water.

Perfected—highly efficient—you can tow it with car or truck to tank car siding, construction site, material yard or other locations where you need steam.

The famous Cleaver-Brooks four-pass fuel travel means low fuel consumption; the turbine type condensate return system cuts water loss—every drop of condensate goes back to the heater under pressure.

Built for full capacity—full time work—Cleaver-Brooks Tank Car Heaters will give you the most in production hours on the job. Write for bulletins and complete information.

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Write On Your Business Letterhead...
For the Bituminous—mix Calculator—a ready reference slide rule showing weight of mix needed in lbs. and tons in relation to width and depth of area to be covered.



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Today, more than ever before, you must know how to analyze building costs. If you want to become a successful builder, learn how to prepare a correct estimate in a hurry. Get in on the profitable work now available wherever you turn. Your success is assured if your estimates are right; otherwise you are licked before you start.

The Tamblyn System of Estimating will make a real estimator out of you in a few weeks of your spare time. We are so sure that you will want to learn it, that we will send you our complete home study course for ten days examination absolutely free. If you don't think it is the finest thing you ever saw, just return it and it won't cost you a cent. If you like it and want it, send us five dollars a month until you have paid the total price of only thirty dollars.

This estimating system is based on forty years of actual construction experience. It has been sold all over the world for more than twenty years. Thousands of estimators and contractors swear by it. Our offer isn't hot air and big talk. We don't give you a diploma or a lapel button, but we do teach you down to earth estimating which will bring you profitable business.

Just send us your name and address today, and we will mail you the complete course at once for your approval.

TAMBLYN SYSTEM
210 Johnson Bldg., CE,
Denver 2, Colo.



C. & E. M. Photo
With the summertime comes the mowing problem. Here one of Montana's highway mowers cuts clover and foxtail. The former, native to Montana, will attain a height of 5 feet.

Better Road Repair On a Small Budget

(Continued from preceding page)

the district with Kalispell as their headquarters. They remove slides, load aggregate, and move dirt for the raising of highway grades.

Funds come entirely from the state tax of 5 cents a gallon on gasoline. Even the registration fees are divided between the state general fund and the counties of origin. The result of this so-called "handicap" is one of the most efficient, centralized, politics-free highway departments in the nation. There is more than a four-year future for the man who works for the Montana Highway Department.

There is no duplication of effort. State headquarters at Helena is the clearing house for all districts. Even the routine purchases District 6 makes, including tractor parts and road asphalt, are handled by the State Purchasing Agent. The District mails in a requisition. The purchasing agent highballs the order. Far from working to a disadvantage, the system has been a big help. Helena is closer to sources of supply than any of its district offices, and its purchasing agent can be expected to "know the ropes" for expediting orders. If what they need is in this country, Helena will usually find it, and quickly.

This one instance shows how the State saves the expense of nine other purchasing agents, that many clerks, and a multitude of paper work, auditing, and accounting. It is just one instance of how effort cannot be wasted when you have to spread a few dollars thin and still satisfy the motoring public.

Helena headquarters will even hire engineering and technical help, but only if a district engineer requests it. It prefers to leave the matter of help to a district engineer's discretion, believing that to shove headquarters-hired help into a subordinate office does not make for good morale or for efficiency. The State of Montana gives veterans job preference. It can use some more capable engineers, surveyors, and draftsmen.

Pavement Patching

Patching holes in road-mixed pavement is one of the big jobs in District 6. During the summer months the section men mix what they estimate will be a winter's supply of bituminous patching. They mix this material somewhere by the side of the highway, and leave it in windrows where the trucks can pick it up. They use motor-grader blades to mix this material. The bitumen content is figured at 17 gallons of asphalt to the cubic yard of aggregate.

At the same time, their trucks haul sand and stockpile it where it will be handy when ice comes down on the highway. Very often they mix calcium chloride with sand to melt ice while it

increases traction.

Patching goes on continuously during the summer season, and whenever climatic conditions permit during the spring or autumn. Holes are cleaned and the sides painted with asphalt. Bituminous material is then raked in place and left about $\frac{1}{2}$ inch high for traffic to compact. One of the battles that goes on all the time between the division men and their help concerns this matter of painting the sides of holes. The boys who do the painting like to see them black. Spurzem knows that a thinner coat makes a much better patch job. He has pretty well cured some of the maintenance men of over-painting by showing them, on hot summer days, how their overpainted patches bleed.

A cause of spring patching is frost action; frost boils have to be dug out and refilled with gravel. Spurzem knows of instances where frost boils were dug out 5 feet deep.

In Montana, highway-maintenance men have developed what they call

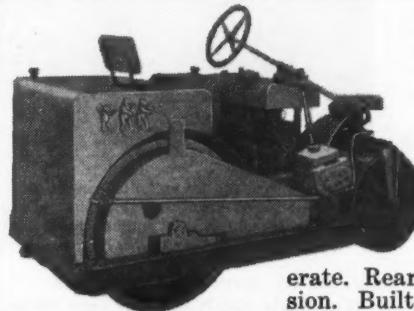
"half soling". Highways on which resurfacing work is planned for the summer get part of the gravel in the early spring months. This gravel helps to fill any holes and it increases traction in snowstorms. When frost leaves the

ground, the gravel and sand are there on the road, ready to be shot with bitumen and mixed. Highways which need resurfacing generally have quite a few irregularities, so this treatment

(Continued on next page)

A TOUGH ROLLER FOR TOUGH JOBS

Pierce-Bear 3 1/2-5 Tons
Variable Weights



Engineered for economical operation where the going is tough. Compact, easy to operate. Rear roller gives heavy duty compression. Built-in water tanks for wet rolling.

Powered with Allis-Chalmers Industrial Heavy-duty Model "B" gasoline engine. Write for details.

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Give the Operator the "Breaks"

You put efficiency into the hands of the operator when you give him an easy-to-handle Bucyrus-Erie Bullgrader mounted on an International TracTractor. He's not afraid to tackle the tough jobs because he knows that he has a real combination digging tool with all the strength and power that the tough jobs require. He prefers a Bucyrus-Erie Bullgrader because, all along the line, it gives him every "break" that means speedy performance:

Unobstructed Vision — The operator sees exactly what the blade is doing from his position on the tractor seat. The hydraulic cylinders are mounted well back, out of his line of vision, and there are no superstructures around which he has to stretch his neck.

Handy Blade Adjustments — The operator can easily angle or tilt the blade in a few minutes without special tools. To angle, he removes landside pins, shifts the blade, replaces pins. To tilt, he uses landside pin to knock out wedges, tilts blade, replaces wedges.

Accurate Control — Giving him quickly responding positive up-and-down control of the blade, the Bucyrus-Erie hydraulic system keeps the operator completely in command of his job, lets him "hold" the blade in position for smooth, even cuts. The conveniently-placed control lever is within easy reach.

Accessibility for Lubrication — The lubrication points on the blade equipment are easy to get at for regular preventive maintenance. Lubrication points on the tractor are also kept free of obstruction.

14745

Other Bullgrader features,
— balanced design, positive
down pressure, scientifically
curved blade, — help make
Bucyrus-Erie fast working
favorites with operators,
too. Ask your International
TracTractor Distributor for
full information.

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See Your
INTERNATIONAL TRACTRACTOR
Distributor

Better Road Repair On a Small Budget

(Continued from preceding page)

has proved 100 per cent effective. It also gives the regular maintenance men a chance to work to some purpose during months which are generally not rushed.

On highway patching where the road is too wet for the patch to bind, Spurzem fills holes with aggregate. This may be done several times before summer comes. Then the gravel is either removed and replaced with a bituminous patch, or shot with bitumen to make a kind of penetration-paving job.

Mowing, Bridge Repair, Striping

Summer brings the problem of roadside and shoulder mowing. New mowers have been difficult to secure, but the District looks forward to an easing of this situation. It has an International and a Toro mower, and both machines work steadily through the summer season. White clover is native to Montana, and unless mowers keep it down it can attain a height of 5 feet.

The machines do approximately 20 miles of single-swath cut in 8 hours on shoulders. The District has adopted a full paving width on its highways, and this has reduced the amount of loose rock the mower blades find. When the summer season is finished, the Kalispell machine shop goes over these mowers and reconditions them thoroughly, so they can start the next season as soon as weeds appear.

Grasses are also native to the state, and the mowers keep those down. Roadside development in Montana has reached the point naturally which other states have tried to duplicate artificially. But Montana, instead of having to cultivate growth on its highway shoulders, has to keep it down instead.

Bridge repair consists of repainting or replacing any broken timbers, and sometimes driving piles. The glacial soil in District 6 is so fine that piles attain little bearing. The State has had to drive piles under bridge abutments as much as 130 feet to get 6 tons of bearing. Fortunately, there are not too many bridges to be kept up, and the state is so sparsely populated that drainage water, in most instances, still



C. & E. M. Photo

At the State Highway Department District 6 headquarters at Kalispell, Mont., asphalt is transferred from an insulated railroad car to a storage tank. If longer than three days in transit on its journey from Billings, it is necessary to fire up a heating boiler for unloading.

follows its natural watercourses.

The State has had to do very little in the way of lighting, but a center-line striping crew operating out of Helena goes all over the state highway system. This is another example of how the State avoids duplication of effort. Montana uses only one color of paint—

white. It shows up excellently against the black highways. Striping crews make the center line broken where passing is permitted. Where passing is prohibited, a solid stripe is painted. On the wider modern highways, a solid white line is painted in the lane adjacent to the broken line to indicate no

passing. Adequate signs at intermittent points indicate "No passing over solid line or when solid line is in your lane".

Snow Removal

Anywhere from October 15 to May 1 snow can be expected in District 6; heavy snows prevail from November 15 to January 15. Sometimes the maintenance men are lucky. Last winter the temperature dipped below zero only twice. But sometimes they get up to 40 feet of snowfall, with 7 feet on the ground. The District uses one-way plows mounted on 2-wheel-drive trucks, V-plows mounted on 4-wheel-drive trucks, and one Snogo rotary machine for the drifts and clean-up. Swirling winds have a way of drifting snow on a highway so that a Snogo is about the only type of machine that will remove it. Adequate snow-removal and sanding equipment is stationed at strategic points throughout the entire state, to begin operating as soon as required and continue 24 hours a day, if necessary.

(Concluded on next page)



Boring transmission case to close tolerances. All holes bored from one setting to insure concentricities and accurate alignments.



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Perfect setting for a "Boring" story!



To assure smooth, efficient operation, all holes in the transmission cases of Oliver "Cletrac" crawler tractors are bored to exceptionally close tolerances from one setting. In this way, we can guarantee the exact alignment of all transmission gears and shafts, assuring economical operation and freedom from excessive maintenance.

This efficient operation not only improves performance, but is another of the cost-cutting steps which make it possible for us to add extra quality without additional cost to you. Extra quality is the standard that characterizes every Oliver "Cletrac" tractor part.

Maintenance of that standard enables your Oliver "Cletrac" dealer to offer you the finest in crawler tractors for your every need.

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Better Road Repair On a Small Budget

(Continued from preceding page)

sary, or until all highways are plowed and sanded.

Ice is a real troublemaker. A phenomenon occurs in part of District 6 called "silver mist". It seems like a light fog that freezes. Roads take on an armor coat of ice. For the first 30 days after the start of any winter season, traffic accidents take a jump. Then people get more careful, and the accident rate subsides.

The sand and calcium-chloride piles that were stored in the summer then come into play. When the ice appears, maintenance men with dump trucks and spreaders work overtime to get the bad places sanded. It is a cold, dreary, and urgently necessary business. For the traffic on the roads consists of commercial vehicles, buses, and automobiles of farmers, ranchers and business men who use the highways the entire year around.

Multiple-Lane-Highway Issue

Native motorists of Montana can be very demanding of their highway-department officials. Al Winkler, Chairman of the Montana State Highway Commission and President of the Western Association of State Highway Officials, lives in Kalispell. He owns one of the leading dry-goods establishments there. Al likes to fish, but his abilities are such that he is always mixed up in some kind of public-betterment activity, to the neglect of his favorite pastime.

In the last few years more and more Montanans have demanded four-lane highways in their talks with Al Winkler. Indeed, four-lane highways are nice, but over most of Montana they would be exactly the same kind of extravagance as if Al were to order twice as much merchandise for his place of business as he could sell.

At the 1946 meeting of the American Association of State Highway Officials, the cry again went up for more multiple-lane highways. So Al drove 10,000 miles at personal expense after that convention to see for himself the percentage of four-lane highways other states had. He drove to Washington, D. C., to New York, to Pennsylvania, and spent a whole day on all the access roads that lead into Chicago. He found that there are not as many four-lane highways, even in the largest cities, as most people believe. He returned to Montana with a wealth of firsthand information for his friends, and a monetary saving for his state. No changes in policy have been ordered.

We have digressed a little here, but it is easy to roam around in Montana's wide open spaces, whether in fact or on paper. And it is a rare public official who thus checks up on his own perspective, with open mind, to see for himself if he is doing a good or a bad job.

Sam C. Ford is Montana's Governor. The State Highway Commission at Helena is headed by H. W. Holmes, with Ray H. Percy as Maintenance Engineer.

Triple Trapping Is Feature of Oil Filter

Extremely fine filtering of oil by means of triple trapping is featured in a new product announced by the C. M. Fuller Co. Known as the Engine-Life, this filter is said to remove foreign particles from oil without affecting the additives in it.

Made in different-size cartridges to fit all cases, it uses long-threaded lint-free textiles as its filtering element. The construction of the unit is said to militate against clogging of any one area of the filter. A strong flexible cir-

cular seal is built in as an integral part of the element. The cylindrical perforated core is made from extra-heavy non-corroding alloy steel.

Laminations within the filter element are composed of several types of vacuum-cleaned, long-fiber, non-shrinking

textiles, Fuller says. Each layer serves as a separate absorbent unit.

Oil users desiring more information about this filtering unit should write the C. M. Fuller Co., 2043 Santa Fe Ave., Los Angeles 21, Calif. Ask for the Engine-Life bulletin.

Chilson In Beckwith Post

Alfred Chilson has succeeded J. Dewy Kolb as Service Manager of its Wilkes-Barre Service Department, the Beckwith Machinery Co., Pennsylvania distributor, has announced.

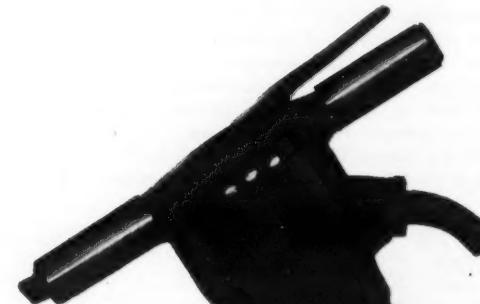
ALL THESE JOBS with THIS ONE TOOL!



Asphalt Cutting



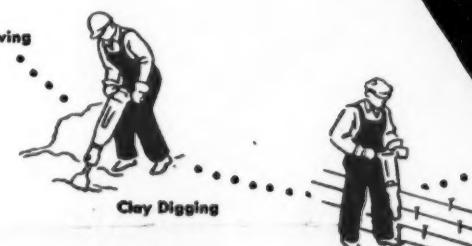
Sheeting Driving



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Rock, Ice, etc.



Dirt Tamping



Clay Digging



Spike Driving

Thor

PAVING BREAKERS

More than just a Buster is a Thor Paving Breaker! With moil points, chisels, wedges, and broaches in 7 styles it breaks concrete, rock, ice, and other materials. With wide-bladed spades it digs clay and hard-pan; cuts asphalt; splits timbers. With a tamper tool it pounds backfill. With an interchangeable Front Head it drives spikes. With another Head it drives sheeting.

And, whatever the job, Thor Breakers are bonus makers. An exclusive short-travel tubular valve, that gets more work from all the air, controls the extra power to drive a reversible, block-type piston in smooth blows. Rugged construction, full air-cushioning and automatic lubrication reduce wear. Get these benefits on your jobs now —ask your nearby Thor Distributor.

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Ease of loading, dependability and economical operation are three Martin CARRYHAUL Trailer characteristics which make them the leaders in the field. Regardless of your hauling job, there's a proper size Martin CARRYHAUL Trailer to do it for you safely and economically.

MARTIN MACHINE COMPANY

KEWANEE, ILLINOIS

Book Discusses Law And the Engineer

A practical discussion of the legal problems and details which daily confront the construction engineer features a two-volume work just published. Titled "The Engineer at Law", the text has been prepared by two Oregon lawyers, Conde B. McCullough, formerly Assistant Chief Engineer in the Oregon Highway Department, and John R. McCullough, attorney for the Transportation Division of the Oregon Public Utilities Commission.

Following a general review of the principles of law, Volume I considers equity, contracts, engineering specifications, property laws, torts, and other applications, giving attention at all times to the engineering aspects. Employment relations, the engineer in court, patents, corporations, utilities, administrative law, the law of sales, negotiable instruments, civil procedure, and allied topics appear in Volume II.

The book aims to give the engineer a

better basic understanding of the law and to acquaint him with the need for satisfying technical requirements of the law in his work. It posts the danger points and pitfalls into which the engineer may fall. It advises him to consult with experts on specific problems rather than attempt to do his own legal work.

"The Engineer at Law" is published in two volumes, each running over 400 pages. It can be secured from The Iowa State College Press, Ames, Iowa, at \$3 per volume.

Bituminous Equipment

Bituminous road-building equipment made by the Rosco Mfg. Co. is described in a catalog issued by the firm. Distributors, heaters, spray bars, burners, tar kettles, street flushers, and brooms are among the items shown. The Rosco 7-way valve for controlling distributor spray pressure is described. Copies of Catalog 44-2 can be obtained from the firm at 3138 Snelling Ave., Minneapolis 6, Minn. Just mention this notice.



4 CARVER features that really pay off on those tough jobs!



Carver pumps are offered with a choice of power and mounting in sizes from 1 1/2" to 10".

Write for Catalog

CPC
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CARVER PUMP CO.
Muscatine, Iowa

Shovel-Crane Units

Three models of mobile pneumatic-tired shovel-cranes are offered by the Michigan Power Shovel Co. All models are convertible to clamshell, dragline, trench hoe, or pile-driving operation. Their capacities are 3/8 and 1/2 yard, and

6 to 12 tons for crane work. A crawler-mounted unit is also available.

Bulletin 12M5 outlines the outstanding features of this Michigan mobile equipment. Copies may be obtained by writing the company at 490 Second St., Benton Harbor, Mich. Mention this notice.

McKiernan-Terry

PILE HAMMERS and EXTRACTORS

On construction projects of unlimited variety, McKiernan-Terry Pile Hammers and Pile Extractors have for the past fifty years been building a world-wide reputation for speed, power, safety and dependability. Greatly expanded manufacturing facilities now make possible prompt deliveries of double-acting hammers in ten standard sizes; double-acting extractors in two sizes; single-acting hammers in five. For full information, write for free McKiernan-Terry Bulletins No. 55 and No. 57.

MK-1004

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Manufacturing Engineers
19 Park Row

New York 7, N.Y.

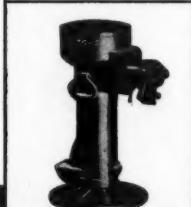
POWER and Speed

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DUFF-NORTON JACKS



DESIGNED and BUILT for HEAVY DUTY CONSTRUCTION SERVICE!



For speed, power, huskiness and ease of operation—Duff-Norton Jacks are unexcelled. Every Jack in the complete Duff-Norton line is made to take tough treatment—made to give you many years of easy-operating, dependable service!

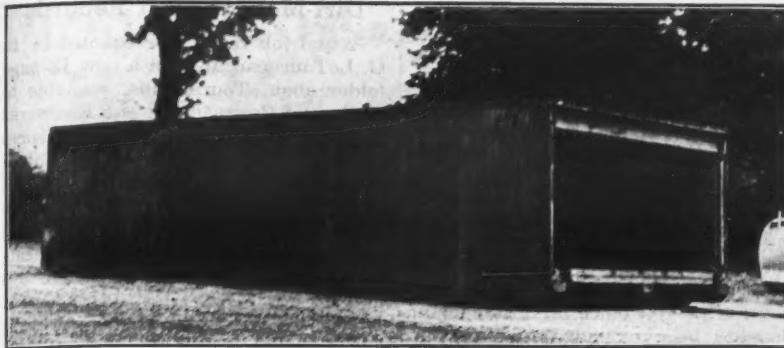


Check your industrial distributor for the facts on Duff-Norton Jacks for construction work. He'll be glad to specify the right Jacks for your specific requirements! Call him today!



THE DUFF-NORTON MANUFACTURING COMPANY
PITTSBURGH, PENNA.

There is a Representative near you!



Boxes measuring 4 x 7 x 17 feet have been purchased by the Ohio Department of Highways to be used for chemicals storage this winter. Mounted on skids, they can be pulled from one point to another by truck. Central storage boxes of this kind will enable the Department to remove ice and snow rapidly from the highways this winter.

Summertime Plans For December Snows

Summertime planning saves winter headaches, the Ohio Department of Highways believes. A program begun in July has made the State ready to combat the worst that the Snow King can offer.

Early in the summer the Department's twelve division engineers were asked to report on their chemical needs for the coming winter, submitting inventories of the stock on hand. On the basis of these reports, the State placed orders for an estimated 75 per cent of its winter needs. Delivered in September, the chemicals, (rock salt and calcium chloride) were distributed to the divisions, and thus are now ready for use the moment a storm strikes.

Ohio motorists will receive added protection this winter, thanks to the Department's foresight not only in putting in its chemical supply, but in checking all its trucks, plows, and other equipment to make certain they are ready to handle all emergencies.

The State stores as much of its chemical as possible indoors. Some is left outdoors, dumped on hard ground and covered with a tarpaulin, where it suffers very little loss from the weather. To supplement its indoor storage facilities, the State has bought surplus 20 and 25-ton storage boxes from the Government. Mounted on skids, these serve as intermediate supply points along the highway.

Engine, Power-Unit Data

Engines and power units driven by gasoline, diesel oil, natural gas, or butane, are listed by the Waukesha Motor Co. in a power-rating chart recently issued. The chart gives a complete tabulation of Waukesha and Heselmann engines, showing dynamometer horsepower, and permissible speeds and loads. Typical applications are shown in photographs.

Copies of this handy reference chart can be obtained by dropping a postcard to the Waukesha Motor Co., Waukesha, Wis. Ask for Bulletin 1079-P and mention this notice.

Brownhoist Staff Shifts

James B. Hayden has retired as Vice President in charge of sales for the Industrial Brownhoist Corp., Bay City, Mich., and has been succeeded by Max



STERLING MACHINERY CORPORATION
405 Southwest Blvd., Kansas City

Stanley See for the Philadelphia office. James A. Peppard continues as Sales Manager for the central states, with his office at Cleveland.

Power, Hand Sprayers For Curing Material

Hand and power sprayers for asphalt and concrete-curing materials are built in a number of models and sizes by W. G. Chausse of Detroit. The firm also makes these units to customer specifications, and supplies barrel carts, hose, and other accessory equipment.

The Chausse hand sprayer is available in 7, 15, and 20-gallon capacities. It features a pressure tank with hand air pump, pressure gage, and a 5-foot spray bar and nozzle. The unit includes a 15-foot length of $\frac{1}{2}$ -inch oil-resisting hose. It is furnished with carrying handles, wheelbarrow mounting, or a 2-wheeled rig.

There are several models of power sprayers. Though their mountings dif-

fer, models PSW, PSWT, and PST-1 all have a gear pump and a V-belt drive from a $1\frac{1}{2}$ -hp air-cooled gasoline engine. Model PSWT has a 55-gallon material tank; PST-1 has a 15-gallon rectangular material tank. Model PST-2 has its pump directly connected to a $2\frac{1}{2}$ -hp gasoline engine; otherwise it is the same as PST-1.

A small air compressor features another Chausse power spray. It is powered by a $1\frac{1}{2}$ -hp engine, and mounted on the pressure tank. The unit has a small auxiliary tank for forcing cleaning fluid through the hose and nozzle. This model comes with a 20 or 30-gallon pressure tank and 2 or 4-wheel carriage. All Chausse power sprayers have a material strainer, pressure gage, adjustable relief valve set at 35 pounds, control valves, hose connections, and a 5-foot spray bar with trigger valve and spray nozzle.

Full details about these sprayers can be obtained on mention of this notice. Write W. G. Chausse, Mfr., 4453 14th St., Detroit 8, Mich.

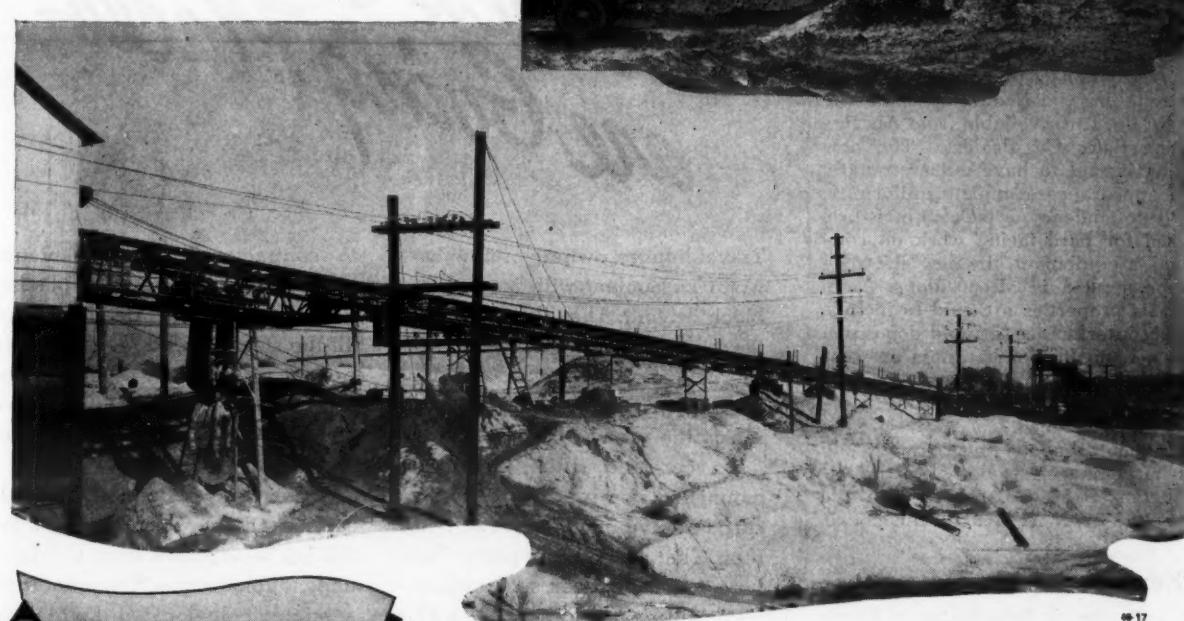
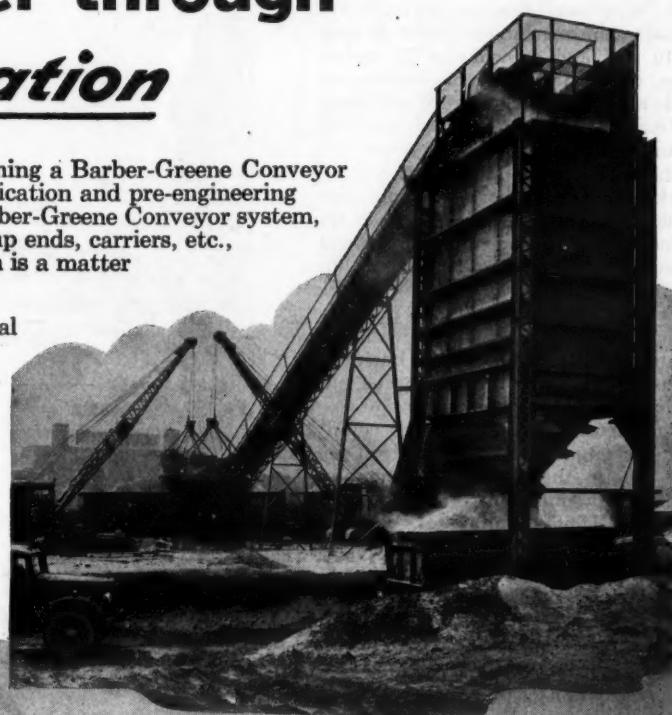
Why changes in Conveyor set-ups are made faster through

BG Standardization

• Setting up, moving, lengthening or shortening a Barber-Greene Conveyor system is greatly facilitated through pre-fabrication and pre-engineering of all units at the factory. In setting up a Barber-Greene Conveyor system, all important units such as drive-ends, take-up ends, carriers, etc., arrive on the job already assembled. Erection is a matter of bolting these units together.

In addition, factory-assembly of these terminal units assures correct assembly. There is no collection of pulleys, bearings, shafts, and gears to fit together. Because they are pre-fabricated units, correct alignment in the erected conveyor is assured, prolonging belt life and insuring minimum maintenance requirements.

Write for the Barber-Greene Belt conveyor Catalog No. 76. Barber-Greene Company, Aurora, Illinois.



Barber-Greene CONSTANT FLOW EQUIPMENT





The Schield Bantam is designed for a wide variety of small dirt-moving jobs.

Small Excavator Has Wide Range of Uses

A versatile excavating machine for a wide range of small jobs is built by the Schield Bantam Co. The unit, called the Bantam, is mounted on a truck, and can be used as a dragline, trench hoe, clamshell crane, or shovel.

Designed for small jobs, the Bantam is light enough to travel on wet lands, yet sturdy enough for heavy work with rocks, the manufacturer states. For ditching, the machine will dig as deep as 10 feet and as wide as 18 inches. Then, with a detachable 36-inch curved blade affixed to the bucket, it will move the earth back into the ditch to cover drain tile, for example.

The basis for the Bantam is a 6 x 6 truck. The unit is of full-circle construction. The circle is welded to the frame of the truck near the rear end. A double-drum unit with motor and swing clutches provides control for the various attachments. Among the parts designed especially for use with the Bantam are a small dragline bucket, a skeleton bucket for the trench hoe, and a Mole's Paw for ditching.

Contractors and state and county highway engineers can obtain full details about the rubber-tire-mounted Bantam on mention of this notice. Write the Schield Bantam Co., Waverly, Iowa.

Electrode Has New Extruded Coating

For use in both ac and dc welders, a new extrusion-coated self-hardening electrode has been developed by the Stoody Co. It is available from Air Reduction Sales Co. dealers. The new coating is said to have extra strength, good appearance, complete uniformity, and little tendency to pick up moisture.

Used for hard-facing work on construction equipment, the new electrode can be applied in all positions, Airco says. Its properties are said to include no slag interference, a rapid deposition rate, and no loss of hardness or wear resistance on multiple layers. Any type of bead can be applied with this electrode, it is claimed.

For details about this new Stoody self-hardening electrode, write the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y. Mention this notice.

Kentucky Aids Counties

The Kentucky Department of Highways and all of the state's 120 counties have completed contracts for state aid in building and maintaining county roads, Commissioner J. Stephen Watkins has reported.

The Department of Highways is obligated to aid in the maintenance of 10,232 miles of county roads, and will assist in the construction of 1,092 miles of new all-weather routes. Contracts have been let in 25 counties for a total of 380 miles of resurfacing and new roads.

is supplying material for the 862 miles of work in counties having registered engineers, but the counties are handling the work.

New Le Roi Branch

Another step in its overall expansion program has been announced by Le Roi Co., Milwaukee, manufacturer of engines, portable air compressors, engine-generator sets, and tractor-mowers. To increase service in the southeastern district, the Le Roi office at Birmingham, Ala., has been extended to offer full factory-branch facilities. A new building at 631 Ninth St., No., has been completed, housing a suite of offices, display floor, service repair shop, and parts department. C. B. Hall is Branch Manager.

The territory for which this branch is now headquarters includes Florida, Georgia, Alabama, Louisiana, Mississippi, the Carolinas, Tennessee, Kentucky, Virginia, West Virginia, Arkansas, and the West Indies.

Dirt-Moving Job Records

Actual job records are quoted by R. G. LeTourneau, Inc., in a new 12-page folder about Tournapulls, available to readers of CONTRACTORS AND ENGINEERS MONTHLY on request. The experiences of eight major contractors who used Tournapulls on 25 projects are reported with illustrations. Information is given regarding methods used. Form G-1073 can be obtained from R. G. LeTourneau, Inc., Peoria, Ill. Just mention this notice.

14-Foot Bituminous Mixer

Discharging a 14-cubic-foot batch in six seconds is the record claimed for the Kwik-Mix No. 14 bituminous mixer, described in a bulletin issued by its manufacturer. Of the non-tilting type, this mixer is portable. Full constructional details are given in the folder, Form KM-173, available to you on request. Write the Kwik-Mix Co., Port Washington, Wis.



Travel-hungry owners of new cars won't be content with around-the-block driving. They'll be taking to the open road—heading for seashore, lake or mountains, or distant hunting ground, or maybe just to satisfy the urge to travel.

As car and truck production mounts, motor traffic promises to surpass anything this country has seen. That means more roads. Two-lane, four-lane, even six-lane highways will be needed to handle this heavier traffic swiftly and safely.

If you have a contract for a highway job, Bethlehem's steel service

to contractors offers advantages well worth considering. By placing a single order with Bethlehem for all the steel needed on a highway project you save in several ways. You save bookkeeping. You save needless follow-ups. And you save by avoiding delays.

When you use Bethlehem's steel service all the steel required for the job is supplied from a single, dependable source. Shipment from a strategically-located Bethlehem warehouse is so scheduled that each individual item is delivered to the job when you are ready for it.

LEADING BETHLEHEM HIGHWAY PRODUCTS

Road Joints	Reinforcing Bars
Bar Mats	Guard Rail
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BETHLEHEM STEEL COMPANY

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On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

STEEL for HIGHWAYS



Mountain Grading Job Has Heavy Rock Cuts

Preparation of Subgrade For Concrete Paving on Old Route Entails Over 100,000 Yards of Rock

THE Arab-Whitesburg Road on Alabama State Route 38 is being rerouted, reconstructed, and paved with reinforced concrete over 18.35 mountainous miles. The State Highway Department has decreed that this unsurfaced, narrow, tortuous section of road between Birmingham, Ala., and Nashville, Tenn., be brought to present-day accepted standards for heavily traveled traffic routes.

The contractor on this 18.35-mile job of grading, drainage, and reinforced-concrete paving, over the old highway north from Arab to the Whitesburg bridge on the Tennessee River, is the Wright Contracting Co. of Columbus, Ga.; its low bid was \$994,918.

Rough Work

For most of its distance, the reconstructed grade to be paved this autumn and next spring lies over the route of the old road. But there was enough rock excavation in the short stretches of relocation to grey the remaining hair of any grizzled old-time contractor. Between 30 and 40 per cent of the total 445,000-cubic-yard unclassified excavation was rock work; and one-fourth of all excavation on the project was rock in a single cut near the top of a mountain. There the cut and fill were so unbalanced that only 50,000 cubic yards of the more than 100,000 cubic yards of rock to be blasted and chewed out of the mountain side could be used within 1,500 feet.

All this is to say nothing of 300,000-yard units of overhaul on unclassified excavation and 211,200 cubic yards of $\frac{1}{2}$ -mile special overhaul for topping material.

Those figures should and do stand alone!

Wright Starts Right

But the Wright Contracting Co., accustomed to rugged working conditions, told its Vice President, W. D. Kirk, to look over the job. It dispatched A. R. Raxter of Lexington, N. C., Construction Superintendent, to the site to get things in motion. Superintendent Raxter has moved quite a number of yards of both dirt and rock in his day and was not at all dismayed at the rough year-long task which appeared to be in prospect.

"The thing to do is get going," he told Vice President Kirk. "Let's get some dynamite up here on this mountain top, start blasting away, and go to work in this big cut with our $1\frac{1}{4}$ -yard Lorain. Those three 10-yard rear-dump Euclids should be naturals for hauling this rock into the fill, and we can use the Koehring $1\frac{3}{4}$ -yard shovel down below in the boulders and limestone."

So, on the fifth of March while the frost was still on the cornstalks left

standing after last year's shocking and the nip of winter remained in the air, the Wright Contracting Co. began moving dirt and rock. Nature was against the contractor, not only in the topography but in the weather as well. From the starting date through the first 65 days of operation, he did well to get in slightly over 50 per cent of possible working time.

But during the days the men and machines could work, they moved a pile of rock and dirt.

Rock Cuts

Near the mountain top is a cut 700 feet long and 50 feet deep where more than 100,000 cubic yards of sandstone and soft coal were to be removed. Into the cut went the Lorain 70 $1\frac{1}{4}$ -yard



C. & E. M. Photo
Part of the excavation on the Wright Contracting Co.'s job was the widening of the old highway. One of the dirt-moving units on this phase of the work was an 8-yard Bucyrus-Erie scraper pulled by an International TD-18 tractor.

shovel. The three diesel-powered 10-yard Euclids were delegated to haul some 50,000 cubic yards of rock from

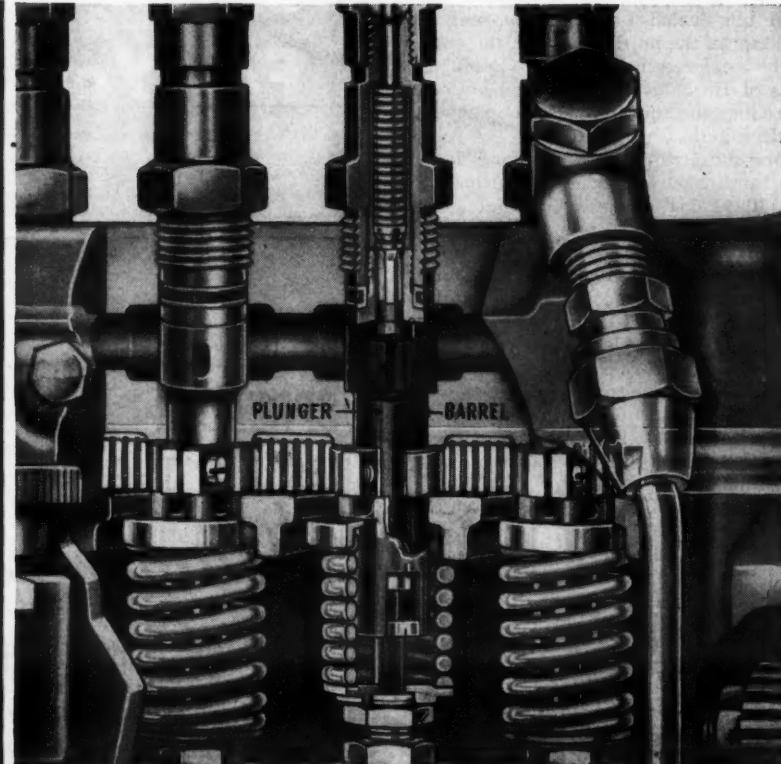
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GOOD FUEL INJECTION

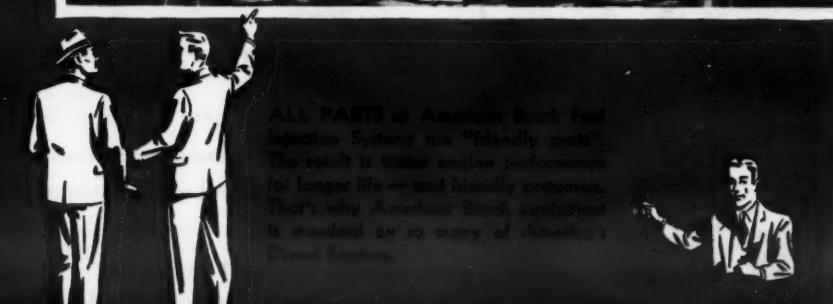
Has Friendly Parts



ANY MACHINE can be only as good as its parts. When precision is measured in millions as in an American Bosch Diesel Fuel Injection Pump it is vital that the parts be "friendly" — each to the other.



AMERICAN BOSCH Fuel Injection Systems have "friendly" parts. For example, look at the elements that put the fuel under injection pressure, called the plunger and barrel. The fit of these two parts actually is measured in terms of millionths of an inch. So the resulting wear and maintenance are played to negligible. It is the result of each component now visible and that they will remain that way.



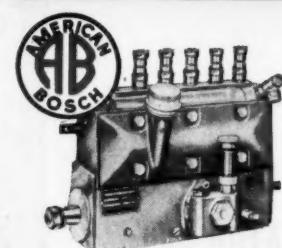
ALL PARTS of American Bosch Fuel Injection Systems are "friendly" parts. The result is better engine performance for longer life — and friendly customers. That's why American Bosch equipment is standard on so many of America's Diesel Engines.

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We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

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AMERICAN BOSCH CORPORATION, SPRINGFIELD 7, MASS.

AMERICAN BOSCH

Diesel Fuel Injection

Mountain Grading Job Has Heavy Rock Cuts

(Continued from preceding page)

this cut into a 400-foot-long fill immediately below. The more than 50 per cent of rock remaining was earmarked for highway widening along the original grade section with hauls of as much as 1 mile.

Meanwhile, a Koehring 701 1 1/4-yard shovel started work in a smaller rock cut several miles down the valley. Although the total yardage in this cut was far less than in the mountain-top cut, the working conditions were more severe. Here, instead of sandstone and soft coal, large boulders and hard limestone were encountered. The Koehring in this cut loaded to three Caterpillar DW10 tractors with Athey 10-yard side-dump wagons.

Neither in the valley nor on the mountain, however, was it exactly a picnic. Even the sandstone imbedded with its inch seams of soft coal was tough to handle. The contractor used three Gardner-Denver compressors, a 365 and a 215-cfm, with one Cleveland and two Ingersoll-Rand rock drills to sink the holes for the dynamite. Drilling was on 5-foot centers—in four lifts on the big 50-foot-deep cut—with 2-inch drills biting down 14 feet for every charge. In the sandstone, the drill bits lasted for about 21 feet of drilling; in the hard limestone, they had to be replaced more often. Some 50 tons of Hercules explosives were used to reduce the rock to a size the shovels could handle.

Despite distinctly adverse conditions, the Lorain shovel in sandstone loaded the 10-yard Euclids with about 1,000 cubic yards of rock every 10-hour shift. The Koehring, in more difficult rock, averaged 600 cubic yards of limestone and boulders to the DW10's with the 10-yard Athey side-dump wagons during the same periods.

Because the strain and stress of the rock excavation is so wearing on shovel cables, the Wright Contracting Co. is using 1-inch 6 x 19 hemp-center pre-formed wire rope to meet the unusual conditions.

In the big, unbalanced rock cut where more than 100,000 cubic yards of sandstone had to be excavated, the Euclids hauled from the 700-foot-long cut to

the 400-foot-long fill. They poured some 50,000 cubic yards of stone into the valley for a subgrade compacted to 95 per cent. On the fill, the sandstone was spread by an International TD-14 tractor with Bucyrus-Erie bulldozer and broken to size by the tractor crawlers. Additional compaction was obtained through the use of a Ragland power-driven tamping roller. The rock was broken down after it was dumped in lifts of not more than 2 feet.

Dirt Work

The task of preparing this narrow old mountain road for its new crown of reinforced concrete is not all rock work. Over the entire 18.35 miles of the contract, only 1.6 miles is relocation or new construction. The old highway had a maximum shoulder-to-shoulder width of 26 feet and at many points was considerably more cramped. The new highway will have a minimum shoulder-to-shoulder width of 34 feet. Backslopes on the original road were steep, averaging about 1 1/2 to 1. With the exception



C. & E. M. Photo
One-fourth of all excavation on the Wright Contracting Co.'s 18.35-mile grading and paving project in Alabama consists of rock. Here a Lorain 1 1/4-yard shovel drops a big one into a 10-yard rear-dump Euclid.

of the rock cuts where the backslopes will run 1/2 to 1, the new highway will have backslopes of 4 to 1.

This widening of the old grade and flattening of backslopes means dirt

work, and Construction Superintendent Raxter had three scrapers—a 12-yard Gay Wood, a 10-yard LeTourneau, and an 8-yard Bucyrus-Erie—working with two International TD-18 tractors and one Caterpillar D7 to move the sand-clay soil from side borrow this spring. In addition to these units, three LeTourneau 12-yard scrapers pulled by Caterpillar D8 tractors were slated to see action on the job before the summer was over. The original three scrapers on the job turned in a good accounting, running a total daily yardage of more than 1,500 cubic yards.

The sand-clay for the widened subgrade was dumped by the scrapers in 6-inch lifts; then 95 per cent compaction was obtained by Bros tandem sheepsfoot rollers pulled by a Caterpillar D4 and a Caterpillar 40 tractor. An International TD-18 pusher assisted the scrapers to capacity loadings. Two Caterpillar No. 12 motor graders help maintain the old road open to traffic while construction is under way

(Concluded on next page)

What a FLINK SELF-FEEDING SPREADER Will Do For You...

NO OTHER SPREADER HAS ALL THE Advantages

of the FLINK Tailgate Type Spreader

1. Enables you to get icy danger spots covered faster.
2. Speed to danger spots, start spreading without stopping truck.
3. Finish spreading—speed on to next spot without stopping truck.
4. Operated entirely by driver with clutch control in cab.
5. Spreads all granular materials up to 1", wet or dry.
6. Does ice control work in winter—road work other seasons.
7. Spreads forward or backward; full or half width of street.
8. Does not limit use of truck; won't interfere with dumping.
9. Attaches to truck as a tailgate; removed in 5 minutes.
10. Self-feeding; no helper required on back of truck. Safer!
11. Saves lives, men and equipment. Saves in every way.



FAST
NON-STOP
SPREADING

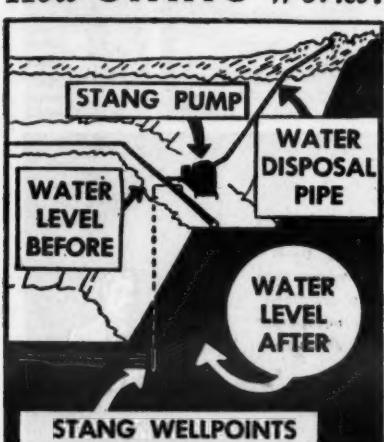
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LIMITING
USE OF TRUCK
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Model HD-4 Hydraulic Drive illustrated. Model WD-31 has rear wheel chain drive. Both models have protective fan blade covering . . . both controlled from cab.

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Mountain Grading Job Has Heavy Rock Cuts

(Continued from preceding page)

and, when called upon, help spread the fill and shape the grade. A Caterpillar D8 with LeTourneau Angledozer and an International TD-18 with Bucyrus-Erie bulldozer complete the equipment line-up on the grading.

Major Items

After the new grade has been completed, a section extending for 230 stations from the Tennessee River to the top of the mountain will be topped with 44,500 cubic yards of pit-run sand-clay obtained from a borrow area near the end of the project. At other short sections along the highway where unstable subgrades are encountered, a total of 2,500 cubic yards of topping material will be used; otherwise the existing crushed-limestone surfacing will simply be windrowed by the motor graders and respread. The 6-inch course of roadbed topping and leveling will be compacted to 100 per cent in two lifts of 3 inches each.

In addition to the dirt and rock excavation and large amount of overhaul, other quantities on the project are equally impressive. Clearing and grubbing, handled by a crew of 32 men with hand tools, totaled 290 acres and ran from light to heavy growth. Incidental to clearing and grubbing of natural growth is the removal or set-back of forty-two structures ranging from stores and filling stations to barns and houses which stand within the 100-foot highway right-of-way.

The completed project will include a sizable amount of roadside development. Sprigging totals 677,600 square yards; sod ditch checks, outlets and flumes run to 11,000 square yards; and solid sodding totals 10,300 square yards. An item of 15,000 square yards of subgrade preparation is designed to provide a stable subgrade in the sandrock cuts. Here the soft sandstone is being undercut 6 inches and backfilled with unclassified material.

Concrete Paving

The contractor planned to complete at least 9 miles of subgrade preparation this year and hoped also to complete concrete paving over this section, while his grading equipment started operations on the remaining 50 per cent of the job. The reinforced-concrete pavement will be 8-6-8 inches over 22 feet of the subgrade with a total of 244,000 square yards of concrete to be poured. This amount of pavement will require 42,784 pounds of reinforcing-steel deformed bars. In addition, other concrete work will include 269.85 cubic yards of Class A concrete culvert extensions, and 109.61 cubic yards of Class B concrete headwalls.

The finished roadway will have fewer curves to vex the motorists, and the degree of its grade will be sharply reduced from the steep original grades. The 700-foot-long cut with the 400-foot-long fill alone will eliminate 5 hazardous curves going down into the valley from the top of the mountain. Maximum curvature on the rebuilt road will be 4 degrees and the maximum grade will be only slightly more than 7 per cent.

Care of Equipment

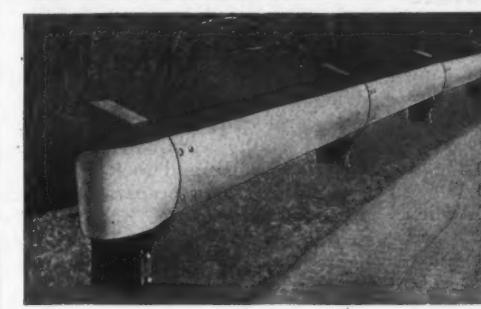
On this rough rock job, the Wright Contracting Co. is taking all the precautions in the book to keep equipment in productive operation. Although there is no field repair shop, three mechanics working in the open with welding outfits and small tools do a good job of keeping the machines in pay dirt. A Le Roi compressor mounted on a 1½-ton truck carries an Alemite pressure-

greasing outfit right out to the equipment and lubricates each unit once during every 10-hour shift.

Personnel

The contractor employs an average of 60 men on grading operations, working daily 10-hour shifts 6 days a week. Construction Superintendent for the Wright Contracting Co. is rock-wise A. R. Raxter of Lexington, N. C., assisted now and then by W. D. Kirk of Columbus, Ga., Vice President of the firm. Project Engineer for the Alabama Highway Department on this contract of nearly \$1,000,000 is L. T. Burleson of Arab, Ala. M. C. Davis, Cullman, Ala., is Resident Engineer; H. D. Burnam, Decatur, Ala., is Division Engineer, and S. E. Caudill, also of Decatur, is Division Assistant Construction Engineer.

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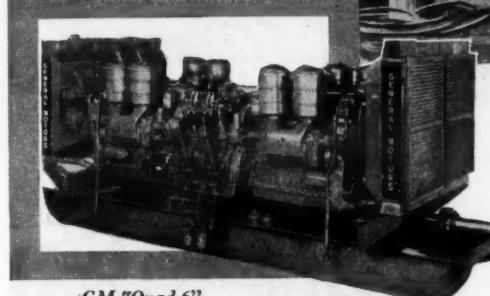
HIGH VISIBILITY, due to convex surface, makes TUTHILL the safer Guard. Seen quicker, warns of danger, is struck less, reduces number of accidents. Spring-bracket supported rails are flexible, yet strong, under impact; deflect cars back into highway, prevent serious damage and undue loss of life. Make TUTHILL, the better Guard Rail, your choice.

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GM Diesels fill all the oil-drillers' musts—then give them more. They are compact and powerful. They can be moved into a job fast and out again when it's done.

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MULTIPLE UNITS Up to 800 H.P.

GENERAL MOTORS

Safety Book Is Aid To All Contractors

Contractors engaged in surface construction, as well as their superintendents and foremen, will find of considerable help a book just published by the Engineering Department of American Mutual Liability Insurance Co. Though small in size, the book is big in value.

Third in the series of safety studies published by American Mutual, the volume is titled "Surface Construction Without Accidents". It omits sales talk, for one doesn't have to convince a contractor that poor job planning and lost time cost money. Speaking straightforwardly, in everyday language, it tells how to control accidents by forestalling them.

Personnel "who think and believe that the best way is the safe way" are vital for sensible construction economy, author H. Edgar Beaven points out. Accident prevention is no mystical stroke of luck. It has, rather, as sci-

tific a basis as that used by the contractor in his estimating and bidding. It is made effective the same way the contractor makes effective his job performance.

Running through 78 pages of readable advice on accident control, the book covers protection of the general public as well as the workman, in clearing, demolition, earth and rock excavation, drainage and base preparation, structures and pavements. Hints are given on first-aid set-ups, and a valuable chapter gives advice on insurance and cost-distribution records.

Free of charge to all interested, this book can be obtained from the American Mutual Liability Insurance Co., 142 Berkeley St., Boston 16, Mass., or from the Reader Service Department of CONTRACTORS AND ENGINEERS MONTHLY.

Free Movie on Canvas

Organizations in the contracting, engineering, and highway fields can obtain free of charge a motion picture for

showing at conventions and meetings, the Philadelphia Textile Finishers has announced. The film deals with cotton canvas as it is used in modern industry and commerce. It gives special emphasis to modern ways of protecting canvas against fire, water, mildew, and other destructive forces. Prints of the 16-mm movie, which runs 22 minutes, can be obtained by organization secretaries who write to Richard Herz, William L. Barrell Co., 40 Worth St., New York 13, N. Y.

Vibrators for Concrete

Two types of concrete vibrators are featured in a leaflet issued by the Baily Vibrator Division of the Stow Mfg. Co. Shown are the Baily Type H, a 3-hp unit capable of 6,000 to 7,200-vpm speeds, and the Junior, built in two speed ranges, 6,200 to 9,000 and 4,000 vpm.

This leaflet will be sent at your request. Write the Baily Vibrator Division, Stow Mfg. Co., Binghamton, N. Y.

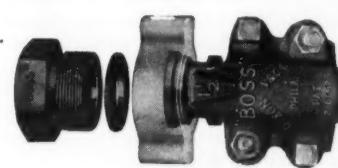
Quality Couplings for Steam, Air, Water Hose



"G J-BOSS"

GROUND JOINT, STYLE X-34 FEMALE HOSE COUPLING

Extensively used in pile-driving, grouting, hydraulic and general steam and air service in heavy construction. Ground joint union between stem and spud provides washerless, leakproof seal. Large Wing Nut facilitates coupling and uncoupling. Has powerful "Boss" Offset and Interlocking Clamp. Sizes $\frac{1}{2}$ " to 4", inclusive. Cadmium plated-rustproof.



"BOSS"

WASHER TYPE, STYLE W-16 FEMALE HOSE COUPLING

Same as "G J-Boss" coupling, above, except that it is designed for washer instead of ground joint seal between stem and spud. Stem is full length, to assure ample support for hose under clamp area. Sizes $\frac{1}{4}$ " to 4", inclusive.



"BOSS" MALE COUPLING STYLE MX-16

Companion to both ground joint and washer type female couplings. Strongest and safest of its kind for all applications, including oil, butane, ammonia, etc. More convenient and economical than regular iron pipe nipples, as each size fits same size straight end hose. Sizes $\frac{1}{4}$ " to 4", inclusive. Cadmium plated-rustproof.

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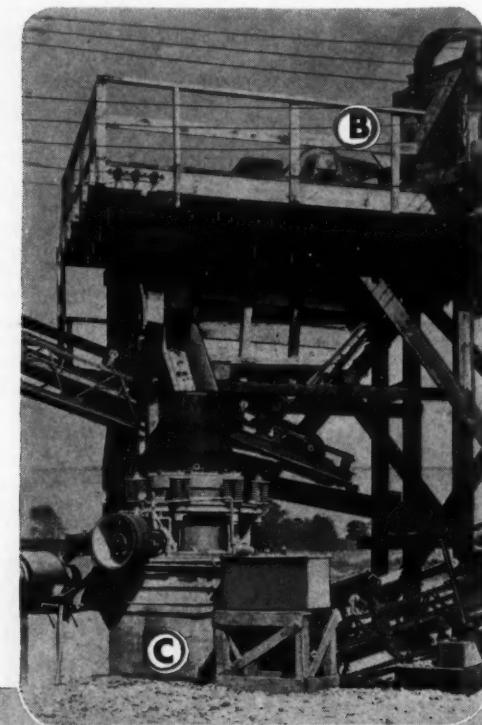
Enclosed is my remittance of \$3 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

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Position _____
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Address _____

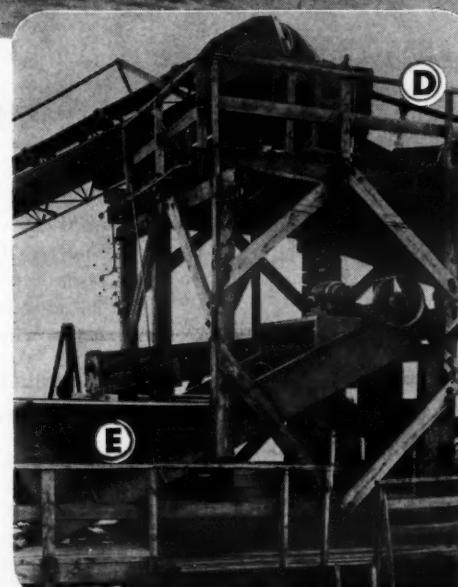
(City) _____
N. B. Cash, check or postage stamps will be entirely acceptable.



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Planes Spray DDT On Roadway Trees

Tree-spraying costs can be cut in half by the use of airplanes, according to recent road operations in the Town of West Tisbury, which is on Martha's Vineyard Island off the coast of Massachusetts. The spraying was part of the Massachusetts Department of Public Works' program to help eradicate the gypsy moth and tent caterpillar. Other spraying with a turbine blower was also recently completed along a 5-mile stretch of Route 1 in the Towns of Foxboro and Wrentham.

The aerial spraying was done for the Department by Frost & Higgins Co., forester of Arlington, Mass. The company used tow planes of the Army basic-training type which can be throttled down to about 80 mph. Flying at a height of from 300 to 400 feet, the planes sprayed a swath about 115 feet wide with a DDT solution made by dissolving one pound of the powder into 1½ gallons of No. 2 fuel oil or kerosene. This produced a 5 per cent solution which, according to experiments of the U. S. Department of Agriculture, will cause no injury to fish or animal life. Talcum powder was added to the solution so that visible results of the application could be noted. About 75 acres were thus treated, using one pound of DDT to the acre. The effects of this spray are said to last two months. This permits spraying of trees in April in order to kill the gypsy moths when they hatch out in the late spring.

The other method involved the same type of solution and a turbine blower mounted on a truck. It was used by the F. A. Bartlett Tree Expert Co. Inc. of Stamford, Conn. Blown 120 feet into the air at a high rate of speed, the foggy spray mushroomed out to settle down over the plants and trees being treated.

John V. McManmon is Landscape Engineer supervising this work for the Massachusetts Department of Public Works.

Joins Meili-Blumberg

J. Frank Sims has been named to the newly created post of Sales Manager by the Meili-Blumberg Corp., New Holstein, Wis. He was with International Harvester for a number of years, and more recently served Contractors Machinery Co. of Batavia, N. Y. Meili-Blumberg plans to expand its lines of road maintainers, material-handling conveyors, trailers, winches, and highway markers.

Panama Engineer Visits U.S.

"Good progress in road building has been made in Panama, and in other countries of Central America," Tomas Guardia, Chief Engineer of the Panama section of the Inter-American Highway, reported on his arrival in this country recently. Señor Guardia is studying our highway-building methods and visiting road-equipment plants as guest of The Institute of Inter-American Affairs.

Having built roads in Central America for a quarter of a century, Señor

Guardia foresees an important increase in highway construction in those countries in the years ahead. "Better transportation facilities are a fundamental factor in the broad and general movement for good will and understanding throughout the Americas," he says, "and I consider it a great privilege to play a part in the work."

Air Compressors Have War-Born Improvements

Wartime engineering developments have been incorporated in the Series 80, first new post-war line of compressors to be offered by the Sullivan Division of the Joy Mfg. Co. Simplicity, compactness, and ruggedness are said to feature the new compressors. The line has seven sizes with actual free-air deliveries of 60, 105, 160, 210, 315, 500, and 630 cfm. Overall size and weight have been reduced in each model.

The 60-cfm size is powered by a gasoline engine, and the 500 and 630 models by diesels. All other sizes have either

gasoline or diesel power units. Depending on the size and model, the compressors are mounted on skids or 2 and 4-wheel trailers, the latter being equipped with automotive-type steering.

Complete details and specifications for any compressor in Series 80 can be obtained from the firm on mention of this notice. Write the Sullivan Division, Joy Mfg. Co., Woodland Ave., Michigan City, Ind.

Gets Ice-Control Job

A former official of the Michigan State Highway Department, Floyd Stevens, has joined the International Salt Co. as a field engineer to assist in its program of snow and ice removal with rock salt. During the war, as a Captain in the Army Engineer Corps, he aided in maintaining the Alaskan Highway.

Order Now! MAKE SURE OF
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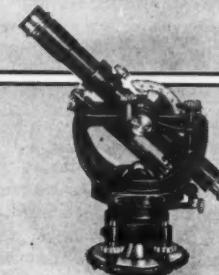
Latest, improved model. Telescope 12" long, 25 power — Horizontal Circle 4½" with vernier to 5 minutes — Vertical Arc 3°.

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RODGERS SHOP PRESSES



SPECIFICATIONS

100 TON SHOP PRESS

Model No. 108A	Bolster Opening		
Specifications	Standard	18"	24"
Overall Height—6½" Ram Travel.....	85½"	85½"	85½"
Overall Height—13" Ram Travel.....	94½"	94½"	94½"
Floor Space—Base.....	44" x 63½"	44" x 63½"	44" x 63½"
Hoist Extends Beyond Base.....	9"	9"	9"
Pump Handle Extends Beyond Base.....	13½"	4½"	7½"
Width Between Side Members.....	45"	45"	45"
Depth Between Side Members.....	8½"	14"	20"
Depth Between Bolsters (Work Table).....	12½"	18"	24"
Maximum Daylight.....	35"	35½"	35½"
Minimum Daylight.....	7"	7½"	7½"

150 TON SHOP PRESS

Model No. 109A	Bolster Opening			
Specifications	Standard	18"	24"	
Overall Height—7½" Ram Travel.....	89"	89"	89"	
Overall Height—13" Ram Travel.....	97½"	97½"	97½"	
Floor Space—Base.....	44" x 70½"	44" x 70½"	44" x 70½"	
Hoist Extends Beyond Base.....	9"	9"	9"	
Pump Handle Extends Beyond Base.....	13½"	4½"	7½"	
Width Between Side Members.....	48"	48"	48"	
Depth Between Side Members.....	8½"	14"	20"	
Depth Between Bolsters (Work Table).....	12½"	18"	24"	
Maximum Daylight.....	35"	35"	35"	
Minimum Daylight.....	7"	7"	7"	

Matched set of "V" blocks are included as standard equipment for both 100 and 150 ton presses.

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Power Pump Units

Portrait in Print

By BILL QUIRK

Construction Company's Growth— A Story of the Brothers DeMatteo

• MARTINO DeMatteo, not long out of his native sunny Italy, started a contracting business 35 years ago with a scraper and a team of horses. Then, he could not foresee a day when 650 trucks alone, not to mention other equipment, would be working for a construction company still bearing his name. The moral of this story might well be—if you want to see your business grow and your name perpetuated, just raise a couple of sturdy boys, teach them your business so that they will have a strong attachment for it, and then turn it over to them when you are ready to retire. Such was the formula followed by Martino DeMatteo, though he may not have been conscious of it, so intent was he on making a living for his family in the little town of Roslindale, Mass., a suburb of Boston. Today the M. DeMatteo Construction Co. is carried on by those two sons, John and Martin, whose "know-how" in heavy construction has enabled their company to bid on and see to completion the biggest jobs their native New England has to offer.

Right now they can usually be found at the East Boston Airport supervising the finishing touches on a \$2,500,000 runway contract. Even with the high-grade field engineers and superintendents on their staff of employees, the project was never left without the personal supervision of one or the other brother. When two shifts were required, the brothers alternated also, but more often than not both were on the job as long as a piece of their equipment was moving. Their presence was far from a perfunctory routine. In their field office, business suits, linen shirts, and neckties were put in lockers as the DeMatteos donned slacks and work shirts to go pounding over the big airport squeezed in the front seat of their little yellow jeep.

"Squeezed in" is correct, for both John and Martin are good-sized men standing a trifle under 6 feet and weighing around 190 pounds. They have a

close family resemblance with black hair, brown eyes, strong white teeth, and olive skin tanned dark by exposure to the sun. Good-looking, pleasant to meet, and possessing an almost boyish charm, they like to talk about their work and take pride in some of the big jobs they have built. John, the elder at 36, is officially President and Treasurer of the M. DeMatteo Construction Co. since the death of his father in 1945. Martin, nine years younger, holds down the posts of Vice President, Manager, and clerk of the company in which both hold all the stock. Actually, on the job, the brothers are apt to be found pitch-

ing in to help wherever their varied abilities can be best utilized. Both are handy with tools, large and small; they can operate all types of construction equipment; and they possess licenses as hoisting engineers and master builders.

A Business Starts

"We were brought up in this business," said John, "working for father during vacations from school in Boston. He taught us all that he knew about construction, and made sure that we could earn a living as skilled workers ourselves. He carried on his business in a modest way as a sole proprietor until I reached 25. Then the M. DeMatteo Construction Co. was born, with Martin Sr. as Treasurer, me as President, and Martin, who was still going to school, as clerk. Our office was in an upstairs room of our small home at Roslindale, and we kept our record files piled up on the attic stairs for want of space.

"Until then," John continued, "father was operating with a small shovel and a

few trucks on various grading or drainage jobs not far from home. The idea of our being a company seemed to give us more confidence, however, and a feeling we should go after some of the many highway contracts that were being advertised in Massachusetts at that time. In 1935 we built a couple of bridges near Canton, another bridge over the Neponset River south of Boston, and before this last job was completed we were also low bidder on a 3½-mile macadam-highway contract outside of Attleboro. In this one year we were up to our necks in over \$300,000 worth of work."

The increased volume of business warranted the purchase of sufficient equipment to keep pace with the expanding young firm, which is now generally recognized as one of the best equipped in the east. Tractors, trucks, and an asphalt plant were purchased, while a quarry was leased and operated by the DeMatteos. Jobs continued to come their way. In 1937, when the

(Continued on next page)

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- **Cone Drum**—better mixing, self-cleaning action.
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- **Simplified Mechanisms**—minimum working parts—one drive shaft, clutches, skip hoist, power take-off and engine all in line and accessible by lifting the doors.
- **Simple Controls**—automatic or manual cycle controls located within easy reach.
- **Big, Wide Skip**—heavily reinforced, long-lived.

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EIGHT SIZES
Up to 1000 Tons per day
DRYERS
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30 to 100 Tons per hour
Electric Batch Timers
50 Years' Experience

THE F. D. CUMMER & SON CO.
EAST 17th & EUCLID
CLEVELAND 15, OHIO

The Brothers DeMatteo

(Continued from preceding page)

attic stairs in the Roslindale menage could no longer contain the files, the company shifted its headquarters to a 3-room office in near-by Milton. Martin was now out of high school and he threw himself into the company's activities with the fresh enthusiasm of youth.

In addition to further highway contracts at Milton, Hyde Park, and Danvers, the company also constructed a \$250,000 water works by-pass in Dorchester for the Metropolitan District Water Commission of Boston. So far, the scope of work was all within a 50-mile radius of company headquarters. This permitted close supervision by the brothers, and the rewards were in proportion to their expended efforts. Wisely, as it later developed, profits were plowed back into the company in the form of increased purchases of equipment, including more tractors and trucks, together with power shovels and earth-moving machines.

Helping the War Effort

With a fine array of construction machinery on hand, the company was able to step right in and participate in the feverish building activity that marked our preparations for war. Military airports were needed in New England and the DeMatteos were just the boys to build them. Their first project in this endeavor was the big airfield at Bedford, 15 miles northwest of Boston, where the Army Engineers awarded them a \$325,000 contract. Other contracts followed, as Bedford was expanded, with the DeMatteos handling over \$1,250,000 worth of construction at this one site. Again, while equipment was still available, they added to their stock of self-propelled earth-movers some rock drills and compressors, plus still more tractors, scrapers, and trucks.

By this time Martino DeMatteo, realizing with fatherly satisfaction that his two boys were doing an excellent job as contractors, retired from the field, leaving the boys on their own. Again they found their Milton office much too small for their still-expanding business, so they acquired a 3-acre piece of ground in Quincy, 8 miles south of Boston. Here in a 450 x 200-foot concrete building the company has a 6-room office and a modern machine and repair shop, while their fleet of construction equipment, painted a bright yellow, is stored either inside or in the yard when not out on a job.

"Our equipment is much in demand by other contractors," said Martin, who looks after that phase of the business. "And you are apt to see our name on machinery almost anywhere around New England if we can spare anything to rent out."

"We make mistakes like everyone else," John continued with a grin. "A couple of years ago we decided to go in

for strip mining at a soft-coal field near Clarendon, Pa. After dropping \$30,000 in that venture, we realized we were doing something we didn't know too much about so we pulled out before losing our shirts altogether."

With airports the story was different. Besides Bedford, the company built airfields at Laconia and Lebanon, N.H.; Winterport, Maine; Cumberland, Md.; Westover Field at Chicopee, and Otis Field at Camp Edwards, Mass. At this last location their work included the construction of bomb shelters and magazines in addition to the airport runways for a total program involving \$2,750,000. The DeMatteos relate with satisfaction that on this big airport job they moved 35,000 yards of material a day, working two 10-hour shifts. Needless to add that there was always one of the brothers around to see that this record was maintained.

Present Work

Besides handling state and Government contracts, the M. DeMatteo Con-

struction Co. does a fair share of street and sidewalk work in the city of Boston. It is also completing a grade-crossing-elimination structure at Templeton in western Massachusetts. The Brothers DeMatteo are getting probably the greatest satisfaction of any job they have attempted from their present East Boston Airport contract. To begin with, they were low bidders by only \$5,000 on a \$2,302,680 contract, their largest to date.

"The major item on this job is the hauling in of over 1,000,000 yards of gravel for the runway foundations," John explained. "The Massachusetts Department of Public Works, which is building this huge international airport, set up a schedule for placing 6,000 to 8,000 yards a day. Within a week of starting the job, we were dumping as much as 16,000 yards a day after a 16 to 18-mile haul. No one, including our competitors, thought we could hit that figure."

Only by careful planning were the DeMatteos able to progress to a point



C. & E. M. Photo
John and Martin—the Brothers DeMatteo who comprise the M. DeMatteo Construction Co. They were caught in working attire on their project at the East Boston, Mass., Airport.

where they were actually three months
(Concluded on next page)

First Step

—PREPARE THE SITE

WITH INTERNATIONAL DIESEL POWER

In clearing areas, excavating foundations or grading a building site, an International Diesel Crawler sets the pace for efficient performance and operating economy.

The International makes quick work of rooting out thickets, second-growth trees, stumps, rocks and other obstacles. Its bulldog hang-on means progress when the going gets tough, for the excellent balance,

good ground contact, and maneuverability of this Diesel crawler permits it to tackle steep grades and overcome difficulties safely.

Information on specifications, performance facts and features that make the International Diesel superior in stamina and operating economy may be secured now—from the International Industrial Power Distributor near you.

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180 North Michigan Avenue
Chicago 1, Illinois

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The Brothers DeMatteo

(Continued from preceding page)

ahead of schedule. By employing as many as 650 trucks and working two 8-hour shifts, they began setting new hauling records. Before making their low bid, the brothers had thoroughly explored the trucking situation in that part of New England, and discovered that large numbers of surplus Army and Navy trucks were soon to be sold. Many of these were bought by veterans with G.I. loans, and these ex-service men soon found a use for their property by hauling gravel on a ton-mile basis. Over 160 subcontractors, many with just a single truck, were working for DeMatteo. The company's own fleet of trucks, augmented by the acquisition of surplus Army units, also formed part of the long convoys that stretched out on the roads for miles north of Boston, hauling gravel from pits around Peabody and Middleton.

Many of the trucks that the DeMatteos were able to purchase from surplus stocks were designed as cargo carriers with fixed bodies not meant for end-dumping. Noticing a winch at the front end of one of the cargo trucks, the brothers checked to see if it were two-way. When they found it was, they bought the cargo trucks. These they ingeniously converted into dump trucks by cutting 2 feet off the rear of the chassis to facilitate dumping, and by building an A-frame in back of the cab. Two sheaves were then rigged up, one at the top of the A-frame and the other beneath the chassis, through which a cable was passed to the winch in front. With the help of the power take-off the truck body could then be raised or lowered as desired, enabling the DeMatteos to haul from 12 to 14 tons of gravel in each reconverted truck.

Side-Stepping Trouble

"That was only one of our problems," John related. "Our gravel hauling was something of a nuisance to the towns through which we passed. Owner-drivers scurrying to make a hot dollar were inclined to overlook the local traffic laws. Then too, the noise of the big shovels loading trucks at the pits annoyed a lot of folks. We were in constant hot water having injunctions slapped on us for violations of town ordinances. The courts upheld us, however, since we were doing something for the common good, I imagine."

GRiffin
WELLPOINT
SYSTEMS
JETTING
PUMPS
FOR SALE
RENT
Prompt Shipments

Send for our New 60 page illustrated catalog
"GRiffin POINTED WELLPOINT FACTS" chock full of latest information on Wellpoint Systems for dewatering, emergency and permanent water supply systems, also information on pressure pumps and data for jetting.

GRiffin WELLPOINT CORP.

881 EAST 141st ST. • NEW YORK 54, N.Y.
Phone: MElrose 5-7704-5-6

Future Outlook

With this airport job practically completed, John and Martin DeMatteo are looking for new worlds to conquer in the shape of still larger projects. One of their ambitions is to build a big dam, a type of work they have never tackled before.

"We'll need some new equipment," Martin suggested enthusiastically. "Big 2½-yard shovels to make the dirt really fly. All we need to do is get a low bid across when some of these dams are being let."

"Well," answered John, a little cautiously, "I think it will take another year before contractors know where they stand and can bid intelligently. Conditions are still mighty uncertain, with new equipment difficult to obtain, and the cost of labor varying so. But I'm optimistic. I see ten beautiful years ahead for contractors. I think it will take that long at least to catch up with the new construction needed."

"We hope to relieve this housing situation ourselves. A year ago we

formed another company known as the J. & M. Co., after our first initials, and are acquiring land to build 27 homes in Roslindale, 44 in West Roxbury, and 49 others in Peabody. We are not going ahead until we get the green light on material necessary to build these homes. When we do, we'll put all our key men on the work and use all possible modern equipment in order to finish them within three months. That is the only way to do the job right and still make a profit. Building piece-meal, as so many houses are thrown up, results in a loss to the builder and shoddy construction to boot."

John DeMatteo is as well grounded in home building as he is in highway, bridge, or airport construction. Back in 1932 during the low point of the depression when his father's contracting business was at a standstill, John found time to marry and build a 6-room home for his wife. They never moved into the new house, for someone made John an attractive offer for his work and he sold it. For the next two years he built

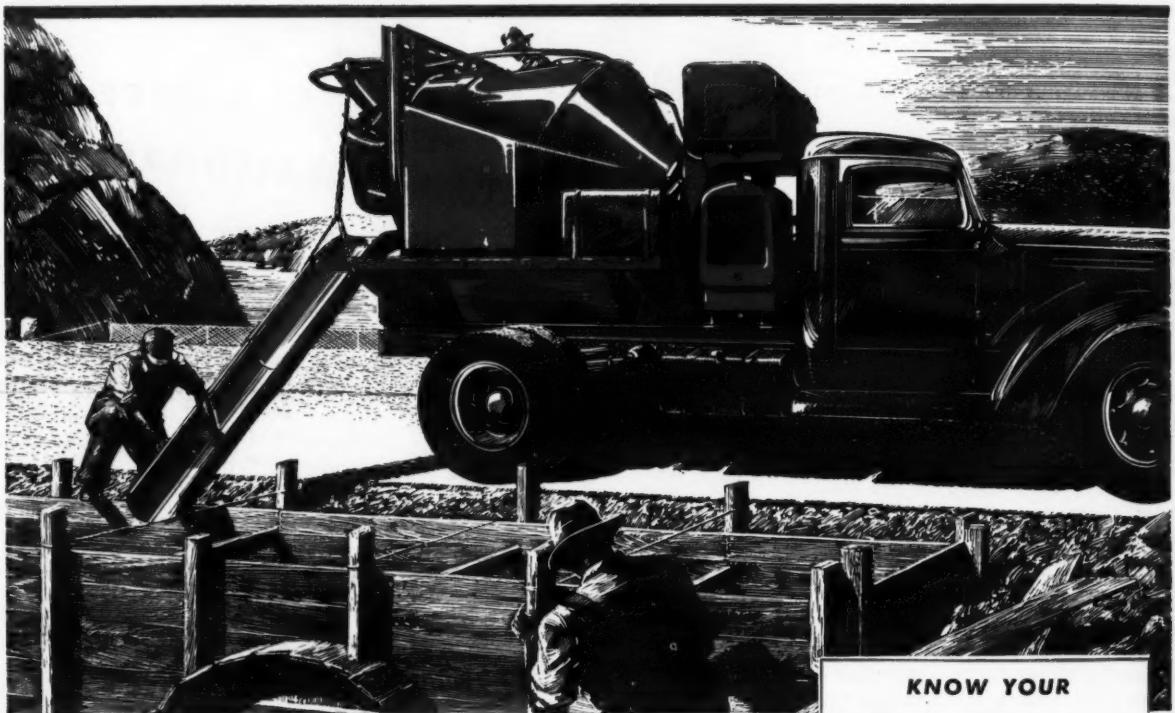
and sold houses, finally constructing one for his own family too, and at the end of that time realized a fair profit. He left building for the heavy-construction industry, but feels that his hands have never lost their skill. If the two brothers do take a flier in the home-building field, it will only be on a temporary leave of absence from heavy construction. They are as closely associated with shovels, tractors, trucks, and scrapers as Boston is with beans.

John lives in his Roslindale home with his wife and 11-year-old boy. The Martin DeMatteos with their three children reside in Jamaica Plain, also a Boston suburb.

"Two years ago we were tempted to give up the contracting business," John reflected. "We had a chance to buy stock in a race track. But this game is in our blood and we would not have been content as owners of a track. Besides, the profits would have been well absorbed by the taxes."

"I'd rather watch a slow tractor than a fast horse any day," added Martin.

HI-UP... IN NAME, REPUTATION AND QUALITY



Flexibility, engineered into all Ransome Blue Brute Truck Mixers, reaches its peak in the new Hi-Up. This flexibility eliminates all strains resulting from misalignment while charging, discharging, or operating over uneven ground. The truck mixer is designed so that when discharging is completed, all moving parts return to their normal positions.

The transmission shows a marked advance over usual design. Enclosed water pump clutch requires no adjustment and at no time is there any need for manual lubrication. A separate engine clutch, two speeds forward and reverse, and multiple disc clutches assure easier starting, a wider performance range and smoother operation.

Other new design details: Unbreakable, anti-freeze gauge glasses, in full view of the operator . . . Quick-charging, unobstructed hopper, with improved sealing door, prevents jamming . . . Positively leak-proof poppet valves with renewable discs — found only in Ransome Truck Mixers . . . Exclusive mixing drum design, with new type spiral blades, for quick charging and fast, clean discharging.

These are but a few of the reasons why the Blue Brute Hi-Up is setting a new high in truck mixer performance — and offering time-saving, trouble-free production of better concrete at lower cost.

Get the whole story from your nearby Worthington-Ransome dealer, or write for Bulletin No. 221.

KNOW YOUR

BLUE BRUTES

Your Blue Brute Distributor will gladly show you how Worthington-Ransome Blue Brute Hi-Up Truck Mixers and other construction equipment can put your planning on a profitable basis — and prove that *there's more worth in Worthington*. His name is listed on Page 65. Blue Brutes include:

RANSOME EQUIPMENT

Pavers, Concrete Spreaders and Finishers*, Portable and Stationary Mixers, Pneumatic Placing Equipment, Truck Mixers, Plaster & Bituminous Mixers and Accessories.

WORTHINGTON EQUIPMENT

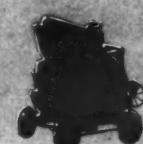
Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Contractors' Pumps* and Accessories.

*To be announced.

BUY BLUE BRUTES



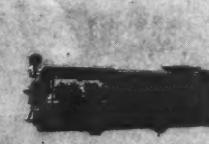
Truck Mixers
Capacities:
2, 3, 4½ cu. yds.



Portable Mixers
Capacities:
3½, 6, 11, 16, 28 cu. ft.



Big Stationary Mixers
Capacities:
28, 56, 84, 126 cu. ft.



Pneumatic Placer
Capacity:
7, 14, 28 cu. ft.

WORTHINGTON

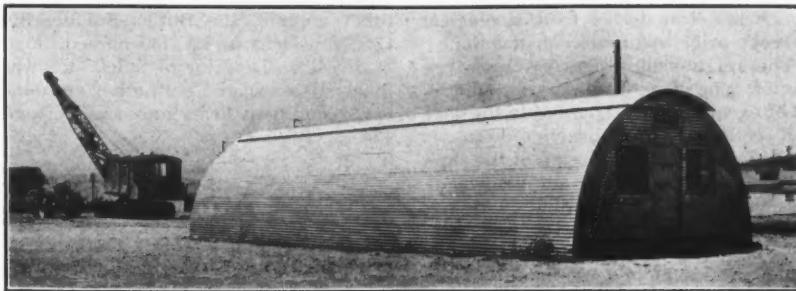

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

Quonset Huts Serve Many Needs in Field

There are many uses that the contractor, highway-department engineer, or airport manager can find for the war-famed Quonset hut. This honorably discharged structure is now being offered for civilian use by the Stran-Steel Division, Great Lakes Steel Corp.

Built of steel, the Quonset uses an arch-rib construction for its framework. This allows much flexibility in its adaptation, and it can be erected, added to, or dismantled with ease, the manufacturer says. Both the outside steel sheeting and the inside materials such as insulation, can be nailed to the steel framing members, which feature a special nailing groove.

Contractors and engineers will find such a structure adaptable for offices, field sheds, barracks, storage buildings, and equipment shelters. Airport managers can use them for radio shacks, dwelling quarters, and offices. Installed on a barge, the Quonset could provide



A Quonset 20 hut serves as a field office on a construction project.

a home for dredging workers.

Basic Quonset units come in widths of 20, 24, and 40 feet. The use of multiple-arch structures can extend these widths to cover far greater areas. As for length, the smaller units can be ex-

tended in multiples of 12 feet, while the larger units can be extended in 20-foot sections. Quonsets 20 and 40 are of clear-span construction.

Doors are usually set in the ends of the smaller Quonsets. Garage-type

doors can be used on the larger units, along the side. Windows can be installed as desired. The units are described as fireproof, safe from lightning, and impervious to sag, rot, warp, and termites.

The Stran-Steel Division will be glad to tell you more about these huts and advise you how you can adapt them to your needs. Write the Division at the Penobscot Building, Detroit 26, Mich.

Heads N.Y.C. Bucket Sales

The Wellman Engineering Co. of Cleveland has announced the appointment of Asa Shiverick as District Sales Manager of its Clamshell and Dragline Bucket Department in the New York territory. Mr. Shiverick has offices in the Graybar Building.

Worthington-Ransome Blue Brute Distributors

See ad on page 84 for list of equipment in each line

Worthington-Ransome Distributors

Ala., Birmingham, Construction Equip. Co.
Ala., Montgomery, Burford-Toothaker Tractor Co.
Alaska, Anchorage, Airport Mac. & Storage Co.
Ariz., Phoenix, Lee Redman Equip. Co.
Cal., San Francisco, Coast Equip. Co.
Cal., Los Angeles, Golden State Equip. Co.
Colo., Denver, Power Equipment Company
Conn., New Haven, Wilhelm-Davies Co., Inc.
Fla., Miami, Allied Equip., Inc.
Fla., Orlando, Highway Equip. & Supply Company
Tampa, Epperson & Company
Ga., Atlanta, Tractor & Machinery Company
Ida., Boise, Olson Manufacturing Co.
Ill., Chicago, Chicago Construction Equip. Co.
Iowa, Cedar Rapids, McNall Machy. & Supply Co.
Ky., Harlan, Croushorn Equip. & Supply Co.
Maine, Portland, Maine Truck-Tractor Company
Mass., Allston, Boston, Clark-Wilcox Co.
Mich., Muskegon, Lakeshore Machy. & Supply Co.
Minn., Minneapolis, Phillipi-Murphy Equip. Co.
Miss., Jackson, Jackson Road Equip. Co.
Mo., Clayton, The Howard Corporation
Montana, Billings, Interstate Truck & Equip. Co.
Helena, Cairo Eng. Works
N.J., No. Bergen, American Air Comp. Corp.
N.M., Albuquerque, Bud Fisher Co.
N.M., Roswell, Smith Machy. Co.
N.Y., Albany, Milton-Hale Machinery Company
New York, Dodge & Hammond, Inc.
N.Y., Olean, Freeborn Equip. Co.
N.Y., Syracuse, Milton-Hale Mach. Co.
N.C., Raleigh, Smith Eat. Co.
N.D., Fargo, Smith Commercial Body Works, Inc.
O.C., Cincinnati, Carroll-Edwards Co.
Okla., Oklahoma City, Townsco Equip. Company
Ore., Portland, Andrews Equip. Service
S.C., Columbia, Smith Equipment Company
Tenn., Knoxville, Dempster Bros., Inc.
Tenn., Nashville, Dempster Bros., Inc.
Tenn., Memphis, Independent Tractor Co.
Tex., Amarillo, T. W. Carpenter Equip. Co.
Tex., Dallas, Shaw Equip. Co.
Tex., Houston, Contractors Equip. Sales & Service Corp.
Tex., San Antonio, Patten Machy. Co.
Tex., Tyler, D. M. McClure Equip. Co.
Utah, Salt Lake City, J. K. Wheeler Mach. Co.
Vt., Barre, A. M. Flanders, Inc.
Wash., Spokane, Andrews Equip. Service
W. Va., E. Charleston Allied Equip. Co.
Wisc., Milwaukee, Drott Tractor Co. Inc.

Ransome Distributors

D. C., Washington, M. A. Doetsch Mach. Company
Ill., Chicago, Thomas Hoist Company
Ind., Fort Wayne, American Steel Supply Corp.
Ky., Paducah, Henry A. Petter Supply Company
La., New Orleans, Old K. Olson Company
Md., Baltimore, Stuart M. Christoff & Company
Mich., Detroit, T. G. Abrams
Neb., Lincoln, Highway Equip. & Supply Co.
N.Y., Buffalo, Murray Equip. Co.
O., Cleveland, H. B. Fuller Equip. Company
Pa., Philadelphia, Giles & Ransome
Pittsburgh, Arrow Supply Company

Worthington Distributors

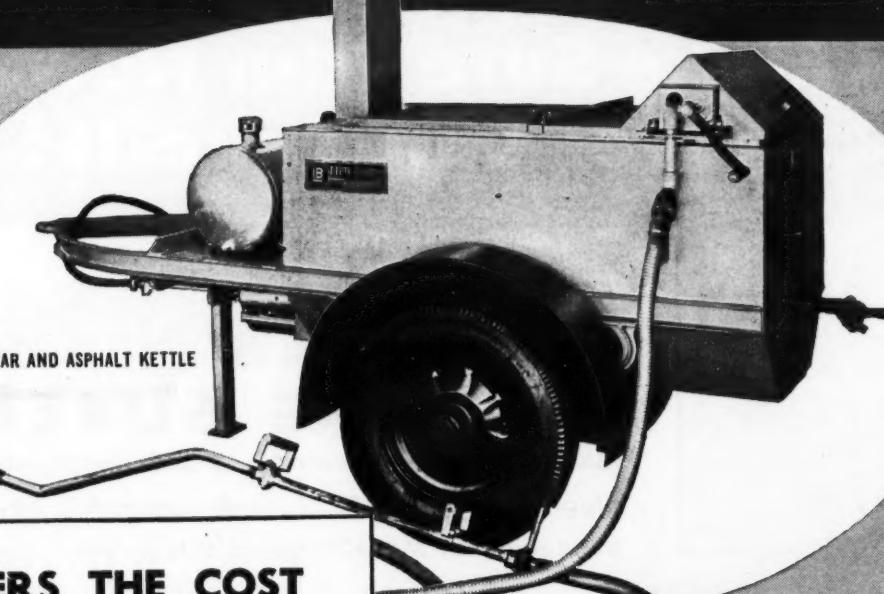
Ark., Fort Smith, R. A. Young & Son
Little Rock, R. A. Young & Son
Ind., Indianapolis, Reid-Holcomb Company
Ky., Louisville, Williams Tractor Company
La., New Orleans, Wm. F. Surgi Equip. Company
Md., Baltimore, D. C. Elphinstone, Inc.
Mass., Cambridge, Field Mach. Company
Mich., Detroit, W. H. Anderson Co., Inc.
Flint, Granden-Hall & Company
Mo., Kansas City, Mach. & Supplies Co.
N.Y., Buffalo, Dow & Co., Inc.
New York, Air Compressor Rental & Sales
O., Cleveland, Gibson-Stewart Company
Toledo, The Kilcorse Mach. Co.
Pa., Allentown, H. N. Crowder, Jr., Inc.
Boston, Sears & Bowers
Harrisburg, American Equip. Corp.
Oil City, Freeborn Equipment Company
Pittsburgh, Atlas Equip. Corp.
Pa., Phil., Metalweld, Inc.
Wilkes-Barre, Ensminger & Company
Texas, El Paso, Equip. Supply Company
Va., Richmond, Highway Mach. & Supply Co.
Wash., Seattle, Star Machinery Company
Wyoming, Cheyenne, Wilson Equip. & Supply Co.

Buy Blue Brutes

Worthington Pump and Machinery Corp.
Worthington-Ransome Construction
Equipment Division
Holyoke, Massachusetts

LITTLEFORD ROAD MAINTENANCE EQUIPMENT

No. 84-HD TAR AND ASPHALT KETTLE



LOWERS THE COST OF ROAD REPAIRS

When Black Top Road Maintenance Equipment can lower the cost on each Road Repair job—that's efficiency. And Efficiency is why Littleford Maintenance Equipment has become so widely used to lower costs.

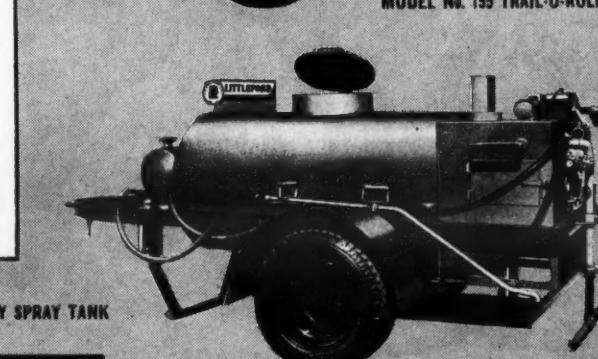
With the 84-HD Kettle, Littleford gives the most efficient heating system—it's faster and safer, utilizes all the heat from the Burner.

The Portable Trail-O-Roller can be taken to numerous jobs in one day—it trails behind a truck—saves moving a heavy roller to the job.

For efficiency plus utility the No. 101 combines three units in one, has Spray Bar, Hand Spray and Pouring Pot Outlet.

For Black Top Equipment Designed for Today or Tomorrow—use Littleford Equipment.

MODEL No. 155 TRAIL-O-ROLLER



No. 101 UTILITY SPRAY TANK



LITTLEFORD

485 E. PEARL ST.,

LITTLEFORD BROS., Inc.

CINCINNATI 2, OHIO

The discharged veteran wears this emblem.

Remember his service and honor him.



Book on Use of Steel As Tunneling Support

Written to help the designing engineer in the drafting room, the resident engineer on the job, and the contractor, his project engineer, and his superintendent, "Rock Tunneling With Steel Supports" is a handbook of interest to all members of the construction fraternity, especially those engaged in subsurface work.

The book reviews briefly the tunnel problems which involve support systems, giving special emphasis to steel supports. It suggests means of solving these problems to the end that rock tunneling become faster, cheaper, and safer. Divided into four sections, the volume covers 271 pages.

The engineering geology that is required for estimating rock pressure on tunnel supports occupies the first section of the book. Written by Karl Terzaghi, world-famed geologist, it gives special attention to the type and accuracy of the practical information

which one can derive from geological surveys prior to tunnel construction.

The relationships between rock behavior, type of steel support, and method of excavation are covered in the second section. The third section discusses analytical methods of design of the supporting structure under assumed loading conditions. A complete and detailed catalog of the steel tunnel supports made by the Commercial Shearing & Stamping Co. rounds out the study.

R. V. Proctor and T. L. White, authors of the text, are officials of the Commercial Shearing & Stamping Co., which has issued the book. The volume is priced at \$2.50 and can be obtained from the company at Youngstown, Ohio, or from this magazine.

Poole Gets Butler Post

Coincident with the inauguration of a national sales-promotion program on its De-Scaler, an anti-scale device for use in the cooling systems of truck and

other engines, the Butler Engineering Co., New Orleans, La., has named Lloyd B. Poole as Director of Sales. He was formerly associated with other automotive-equipment firms such as Firestone Tire & Rubber Co.

Grinder Attachment Serves Two-Fold Use

Light burring and grinding such as is needed in highway department shops and depots can be performed on a new narrow-belt grinder attachment being offered by the Porter-Cable Machine Co. Furnished without a motor, the unit attaches to the bench-type wheel grinder to which a resilient contact roll has been fitted.

The new attachment is said to combine the versatility of platen grinding with the economy and speed of contact grinding. The platen is 2 x 4 inches in size, and the endless abrasive belt is 48 inches long and 2 inches wide. The unit can be set up in any position from

vertical to horizontal in the 90-degree arc.

Complete details about grinder attachment N-2 can be obtained from the Porter-Cable Machine Co., 1714 No. Salina St., Syracuse, N. Y., on mention of this notice.

Powerful Pulling and Pushing with Simplex Jacks

The numerous pulling and pushing jobs encountered in construction work can be most safely, easily and economically performed with Simplex Jacks.



Steamboat Ratchet Pulling Jacks
are real savers of time and money on coffer dams, or concrete and steel construction requiring false work or framing. 8 and 15-ton capacity. Also available with lock-link hook ends.



Push and Pull Jacks
These powerful jacks are widely used for pulling together or pushing apart structural members; and in the erection of bridges, large tanks and heavy cement forms. No. 1524 (shown) 15-ton capacity. Other models 8 and 10-tons.



Shoring Jacks
Provide greatest safety factor in shoring work, timbering and for use as temporary columns and other supporting work. 25 and 35-ton capacities.

In construction or demolition work, walls or other vertical structures can be held rigid and secure by using Simplex Shoring Jacks to push and Simplex Pulling Jacks to pull against them. They are safe, efficient and easy to use.

Templeton, Kenly & Co.
Chicago 44, Ill.

SIMPLEX WORLD'S MOST COMPLETE LINE OF JACKS

LEVER SCREW HYDRAULIC

Change of Address

(Mail to Contractors and Engineers Monthly, 470 4th Ave., New York 16, today)

From _____

(Former address)

To _____

(New address)

Name _____

Firm _____

Position _____

Make Sure Your New Shovel Can Take It!

WITH A **MARION** YOU ARE SURE!

MARIONS are engineered and built for tough digging. They are fast, sturdy, powerful, dependable. Let MARION prove this to you.

WHAT IS YOUR PROBLEM?

MARION

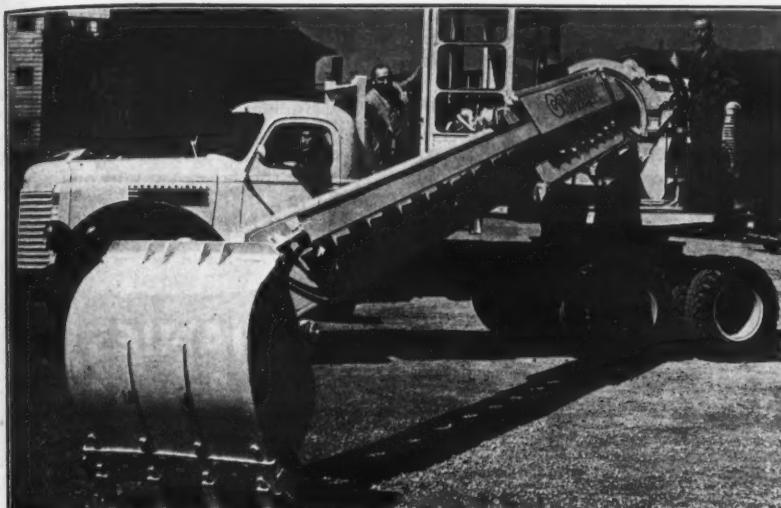
POWER SHOVEL COMPANY
MARION, OHIO, U. S. A.
Offices and Warehouses in all Principal Cities • Established 1884



MARION

POWER SHOVEL COMPANY
MARION, OHIO, U. S. A.

Offices and Warehouses in all Principal Cities • Established 1884



Thomas Conte (center), partner of Construction Equipment & Supply Co., Pittsburgh, accepts delivery of the first Gradall produced by The Warner & Swasey Co., which is making its bow in the construction field with this multi-purpose earth-moving machine. Ray Ferwerda, Cleveland contractor, inventor of the Gradall, is in the driver's seat, and S. J. Beatty, Jr., in charge of Gradall sales for Warner & Swasey, is on the rotating platform, which has a 360-degree swing, at the rear of the machine.

New Earth-Mover at Work;

W & S Distribution Plans

Delivery of the first Gradall, a many-purpose earth-mover, has been announced by The Warner & Swasey Co., Cleveland. If the production scene is favorable, the firm expects to deliver about 50 of the machines during the last quarter of 1946.

Invented by Ray Ferwerda, a Cleveland contractor, the Gradall features a 24-foot telescoping boom mounted on a 360-degree turntable. Attachments on the boom allow it to dig, trench, clean ditches, do snow removal, scraping, and other tasks. The boom can be tilted 45 degrees in either direction from the horizontal, raised 22 degrees into the air, or lowered as much as 44 degrees. The unit is mounted on an International Harvester 6-wheel truck chassis.

The first machine, which went into action on a flood-control dam at Blairsville, Pa., was delivered recently to The Construction Equipment & Supply Co. of Pittsburgh. The firm will distribute Gradalls in western Pennsylvania and the West Virginia panhandle.

S. J. Beatty, Jr., has been named Assistant Sales Manager in charge of the Gradall Division, created by Warner & Swasey to be responsible for the distribution of the new machine. Contractors and highway departments will be reached through regular distributors.

Shunk Snow Plow and Ice Removal BLADES

Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

FOR ALL TYPES AND MODELS OF SNOW PLOWS
Various widths, lengths, thicknesses—flat or curved—standard or special-punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE

Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.



Shunk
MANUFACTURING
COMPANY
ESTABLISHED 1854
BUCKEY, OHIO

U. S. Funds to Build Bridges Over Dams

Federal agencies can now build needed public highway bridges over dams constructed by them, a new national law provides. The agency which has jurisdiction over the dam will design and build the bridge, as well as any needed dam-structure modifications, at the request of the Public Roads Administration and the state highway department concerned. The state, or one of its units, must build and maintain necessary bridge approaches and connecting roads.

The agency responsible for the dam must follow PRA advice and standards relative to the highway features of the bridge. It is authorized to convey to the state any Federal lands, right-of-ways, easements, etc., under its control that may be needed for the approach roads.

A \$10,000,000 fund is made available for expenditures by PRA to reimburse other Federal agencies for such work.

The added design and construction costs of the dam and the entire cost of the bridge are to be paid wholly from Federal funds. PRA may also determine that portions of the bridge extending beyond the dam are to be so financed. The state can request Federal-Aid funds for its work on the approaches and connecting routes. If the bridge across a dam is built by the Federal agency for its own needs or because of a legal obligation to relocate another bridge or highway, the agency must pay the costs from its own funds, and cannot charge them to the special fund.

Landing Field in Sky

Asphalt plank made by the Servicised Products Corp. of Chicago was used on the roof of the Merchandise Mart, the world's largest building, as a landing surface for the new Helicopter air-mail speed-up service. This service is expected to clip from 1 to 12 hours time for delivery of air-mail between Chicago and other cities.



Ready to serve!

You can't pass road mixes across the counter like sugar or salt, but certain unique features of KOTAL MASTER MIXES make it possible to handle them almost as easily as that.

KOTAL MASTER MIXES can be stockpiled ready for delivery in any quantity at any time, regard-

less of season or weather. That's a great convenience and a saving for plant, contractor and customer. Only the KOTAL Process makes this possible.

Let us tell you more about this important scientific development in the art of road building and maintenance. We'll gladly send free booklet to you—also the name of your nearest supplier.



KOTAL COMPANY
360-68 Springfield Ave. ★ Summit, N. J.

KOTAL Master Mixes

The Advanced All-Weather Aid in Building Better Roads

Small Blast Cap Is Charged With RDX

A radically new Western Big Inch blasting fuse cap has been announced by Olin Industries. About $\frac{1}{2}$ inch shorter than other caps, the new detonator makes use of cyclonite, better known as RDX. This constitutes the first known commercial use for the wartime explosive, Olin says. Its tremendous power—rated as 50 per cent higher than TNT—is said to make possible the small size of the new cap, $1\frac{1}{8}$ inches long and less than $\frac{1}{4}$ inch in diameter.

The Big Inch can be used for all types of blasting where fuse caps are needed, and it is unaffected by temperature extremes, the manufacturer states. Made of shiny aluminum, it is easy to find if dropped accidentally. Its shortness makes for easy and complete insertion into the stick of dynamite; thus the risk of its being struck by the tamper bar is reduced. The Big Inch is also said to withstand the shock of a

heavy impact without detonating, an added safety factor.

Contractors who have blasting to do can secure more complete details about the Big Inch by writing the Explosives Division, Olin Industries, Inc., East Alton, Ill. Tell the firm you read this news report.

Thor Outlet in St. Paul

The Independent Pneumatic Tool Co. has opened a branch sales office for Thor portable pneumatic and electric tools at St. Paul, Minn. Located at 220 W. 7th St., the office will serve Minnesota, northwest Wisconsin, the eastern Dakotas, and Michigan's upper peninsula. Joseph A. Bell, sales representative for the area during the past six years, is Manager of the branch.

Boiler-Water Tester

The hardness, alkalinity, and chloride content of feed water for boilers can be tested with a new kit made by the Per-

mutit Co., 330 W. 42nd St., New York 18, N. Y. A portable white enamel cabinet, $10 \times 10 \times 4\frac{1}{4}$ inches, holds test solutions and pipette droppers. The unit can be modified to permit testing sodium sulfite in boiler water.

Permutit will send CONTRACTORS AND ENGINEERS MONTHLY readers full details on mention of this notice.

Takes Turner Post in N.E.

Nicholas B. O'Connell has been appointed General Superintendent for the New England District, the Turner Construction Co. has announced. He succeeds retiring R. F. Egelhoff, who will serve as special consultant and advisor to Turner.



THE HIGHWAY MODEL DD MOTOR DRIVEN SAND AND CINDER SPREADER

The Model DD Highway Spreader clamps onto the tail gate of any standard dump truck permitting one man to cast a uniform swath of sand or cinders 8 to 60 feet wide at truck speeds up to 35 miles per hour. Simple adjustment keeps spreader in horizontal position to cast material under and ahead of rear truck wheels permitting truck to travel ahead of traffic with safety. Material is fed into hopper by gravity—no shoveling is required. Unit is equipped with adjustable feed gates controlling thickness of spread and the throttle on the 1½ H. P. Briggs and Stratton gasoline motor determines the width of spread. Widely used for ice control work in winter, the Highway Model DD is also ideal for seal coat work and dust control in summer. Write for descriptive literature.

THE HI-WAY MODEL R MATERIAL SPREADER

Offers these time-saving profit-making features

- Spiral feed roller with agitator-conveyor provides fast, accurate distribution of material. Adjustable feed gate controls desired thickness of spread. Width of spread is adjustable from one foot to full width of spreader.



WRITE FOR COMPLETE DETAILS

HIGHWAY EQUIPMENT COMPANY

601 D Avenue, N. W.

Cedar Rapids, Iowa

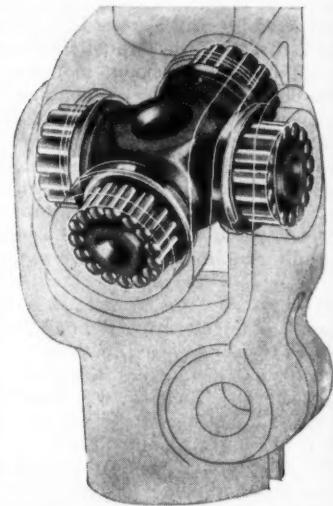
Manufacturers of the world's most complete line of spreaders

Sold and distributed by leading Construction Machinery Dealers throughout the United States and Foreign Countries:



Help Keep 'Em Busy on Productive Work

By equipping your machines with MECHANICS Roller Bearing UNIVERSAL JOINTS, you help protect their reputation for reliable, economical operation. MECHANICS' lifetime or once-a-season lubrication feature saves up to ten percent of the operator's time — formerly spent greasing plain bearing joints — cuts down grease cost, and avoids expensive break-downs caused by insufficient lubrication. Let our engineers show you how this and other MECHANICS advantages will increase the productive work accomplished by your machines.



MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2026 Harrison Ave., Rockford, Ill.

EASTMAN

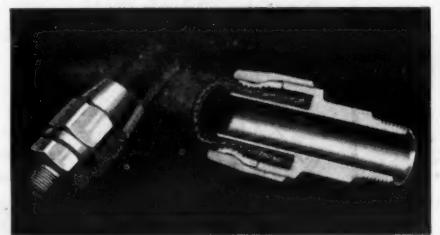
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A National Program For Secondary Roads

Progress Is Being Made in Selection And Approval of Secondary-Road Systems; Some Funds Are Available; Work Awaits Favorable Conditions

By THOMAS H. MACDONALD, Commissioner, Public Roads Administration

♦ THERE is provided in the Federal Highway Act of 1944 a three-way plan of action for the nation-wide development of secondary roads. This is a long-range undertaking. The conditions to be met vary between wide extremes. At first thought, a reasonably uniform and universally applicable program appears difficult, and perhaps to many impracticable. Such, however, is not true, for we have an unfailing guide:

"The justification for the expenditure of public money in the improvement of the highway must be found in the traffic itself. Not only the present amount of traffic on the road, but also the amount it would be increased by improved conditions, should be taken into account."

"The volume of traffic over the public roads, on which is based their value to the community through which they pass, can only be estimated by totaling the amount which each individual uses the road."

"It will be seen that the important traffic, from the standpoint of road improvement, is not the heavy hauling, but rather the light travel.

"The travel to market and other light travel are without doubt the most important classes of traffic which the public roads carry. Therefore, the value of improvements must be based largely on the stimulus and beneficial results they give to these two classes."

These are excerpts from the 1906 revision of the "Manual for Iowa Highway Officers". There was not, to my knowledge, a motor vehicle on a single farm in the state at that time. But the statements the manual contains are not statements of theory as of that time. They are the principles evolved from surveys which secured from each farm family the facts as to its daily and yearly use of rural roads. Since the manual was issued, forty years of highway history have passed. However, its principles are as valid today as they were then, although there are totally changed types of vehicles upon the roads, and many-times-multiplied miles of travel over them. They indicate how persistent is the pattern of highway transport necessary to the individual whose home and occupation are on the farm. While the road mileage which he uses has now been increased, the pattern of his daily use remains constant. This is the reason that we may have faith in the future program for the development of rural highways; for the new program is based upon a determination of just how people who are dependent on them need to use the roads.

Selection of Secondary Systems

There are more than 3,000,000 miles of public roads in the United States. There are many laws, state and local, and many jurisdictions over segments of the whole, which have all too frequently operated independently. Nevertheless, it has long been accepted by road officials that, to insure progress in improvement consistent with the need, it is essential that this overall mileage be separated into systems. The beneficial results accruing from such a course have been amply demonstrated by the Federal-Aid system, the state highway systems, and in many counties where classification based on relative importance is in effect.

Regulations for the selection of the secondary-road systems were devel-

oped by the Public Roads Administration in cooperation with state highway officials and county engineer consultants. These regulations place no mileage limitation on the extent of the state systems of secondary roads. But they do include two principal requirements: first, that the selection of secondary roads shall constitute an integrated system within themselves and with the primary roads of the state; and second, that the extent of the system shall be consistent with the anticipated finances available for their construction and maintenance.

Up to the first of June, 43 states, the District of Columbia, and Puerto Rico had submitted systems which have been approved, totaling 200,241 miles, and there were under review 85,775 miles, a total of 286,016 miles.

The reassuring element in the selection of this immense mileage is that the choice has been predicated upon the detailed studies of traffic volume in the highway-planning surveys. This should not be construed to mean, however, that

existing traffic volume is the only, or even the most important, criterion. It is true that the yardstick of traffic volume reasonably fixes the relative service requirements of the Federal-Aid and state highways. However, service for the land and for the development of natural resources, such as mines and timber, must be given equal weight in the selection of the secondary-road system. The ultimate goal is to extend ade-

quate service to every farm home or substantial source of raw materials needed for production. Currently, the extent of the systems has been determined on a state-wide basis; mileage has been allocated to the counties or local-road jurisdictions on the basis of formulae reflecting various factors. The application of such formulae has been necessary as an expedient to permit im-

(Continued on next page)

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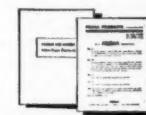
2 But what happens if the Aquella surface coating is scraped off? To answer that, we scraped away this portion, and there's still no leakage. This may be slightly puzzling until you study the photograph of the third step...

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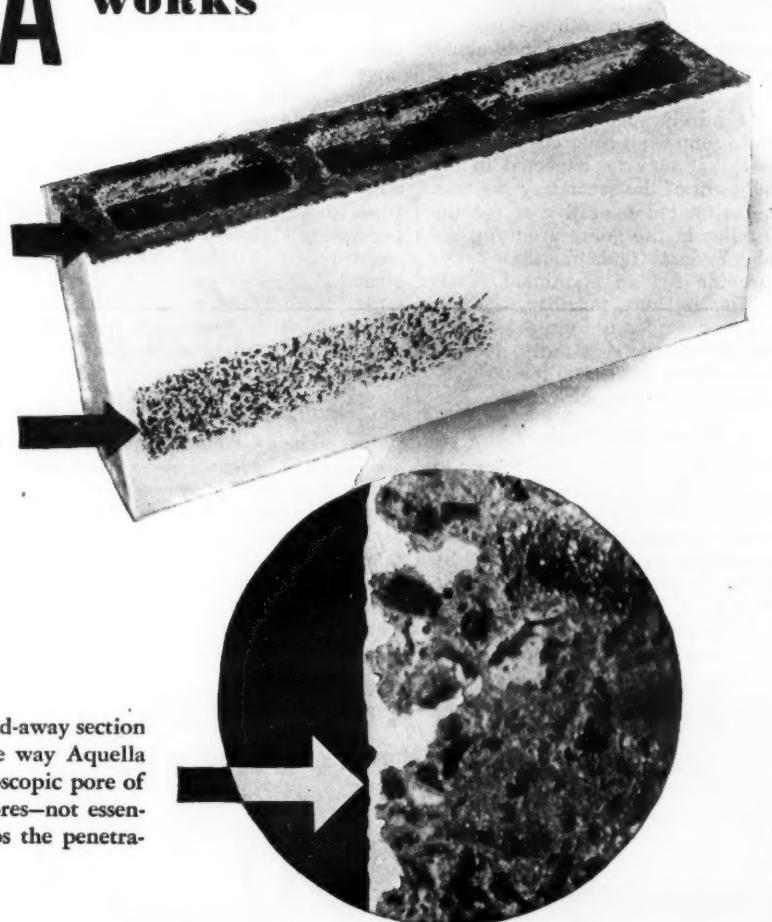


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Secondary Roads

(Continued from preceding page)

mediate action. But there lies ahead a need to revise the systems, county by county. This revision must be directed towards the goal of a completely adequate system of secondary roads.

It is apparent that the selection of secondary systems is a continuous undertaking. It must not be permitted to become static. As rapidly as possible the mileage that can be built to adequate standards and maintained with the income available must be determined for county units. The one important policy is the maintenance of full cooperation among local, state, and Federal officials administering this work.

Secondary-Road Programs

While the selection of the systems has been in progress, the construction programs of projects have been formulated. As of June 1, 2,851 projects, estimated to cost \$217,000,000 for more than 12,000 miles of road, had been included in the going program. The funds for them include pre-war balances and the new post-war secondary-road funds. As of the same date, including the funds recently allocated for the fiscal year 1947, there is an unprogrammed balance of \$209,000,000 of Federal funds alone.

It is possible to make future estimates based on these existing figures. While they are purely speculative, they will reduce to somewhat concrete terms the progress that may be expected in the improvement of the secondary systems. At the estimated overall cost for the 12,000 miles in the going program, the available Federal funds plus state funds will provide for an additional 23,000 miles. This mileage, together with the current program, would improve about one-eighth of the presently recommended mileage of 286,000 for the secondary-road systems.

Road Standards

This may be as good a time as any to lay a ghost—the ghost that the Public Roads Administration demands too high standards. Actually, the only standards for secondary roads ever issued by Public Roads, with the exception of the two details of width of grading and width of permanent bridges, are the

standards adopted August 1, 1945. These standards were developed by the Design Committee of the American Association of State Highway Officials and Public Roads. Actually, the minimums they include are probably open to the criticism that they are too low rather than too high. At least that is the conclusion of the Board of County Engineer Consultants appointed by Public Roads to reflect the viewpoint of the county officials. The appointment of this Board is no passing gesture. We have the same respect for it and confidence in it that we have in our own personnel. Its work has been of tremendous value already, although it is only starting. Given a little time and reasonable patience, Public Roads in cooperation with this Board will endeavor to reach and remedy the causes of every legitimate complaint.

These standards have previously been brought to the attention of the National Association of County Officials, and no criticism has been voiced. This does not mean that there has been no misapplication of standards, however. The real problem is not lower improvement standards, but higher administrative and technical competence in their application. This we hope to assist in bringing about, although it will take time, through the establishment of a division dealing exclusively with this field of operation.

One fact should be inserted right here. The most enduring assets we have in our roads are permanent bridges, and it is not economy to build short-lived ones. Now it is characteristic of our Federal-Aid secondary-road projects that they include many bridges. And the cost of such long-lived structures materially raises the average cost per mile of Federal-Aid secondary-road construction. These Federal-Aid construction costs are frequently compared with costs of other secondary roads from which bridge costs have been omitted. Obviously such comparisons are unsound.

Financing Secondary Roads

All highway construction was once supported by revenues derived from property taxes. This was prior to the advent of motor-vehicle traffic and the consequent earnings from road-user taxes. Since then, road income from property sources has constantly been replaced by income from the road user. The year of greatest revenue from

property sources was 1928, when the total amounted to \$499,000,000. As late as 1931 this total amounted to \$459,000,000. But during the depression years the amount fell off rapidly, reaching a minimum of \$236,000,000 in 1934. Recovery since that year has been relatively slight, amounting only to a rise of \$21,000,000 between 1934 and 1941. In 1941 the highway income from property taxes levied by counties and other

local rural-road agencies was \$257,000,000.

There has been a constant increase in the state user taxes allocated to local roads, as follows:

For the 5-year period 1927-31, the annual average amount was \$157,000,000; for the 5-year period 1932-36 the average annual amount was \$222,000,000; and for the 5-year period 1937-41

(Concluded on next page)



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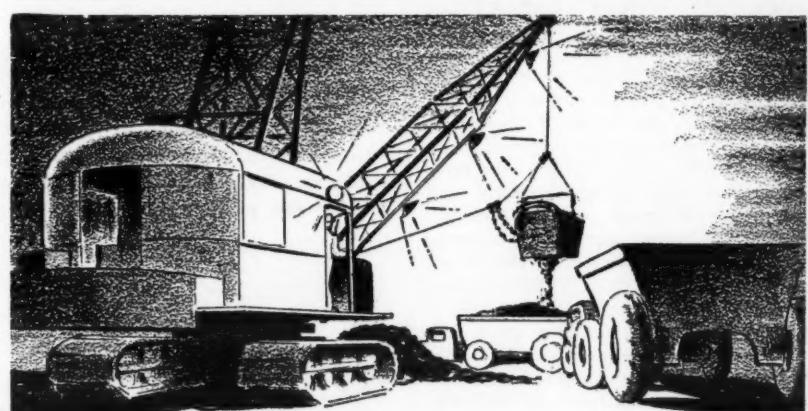
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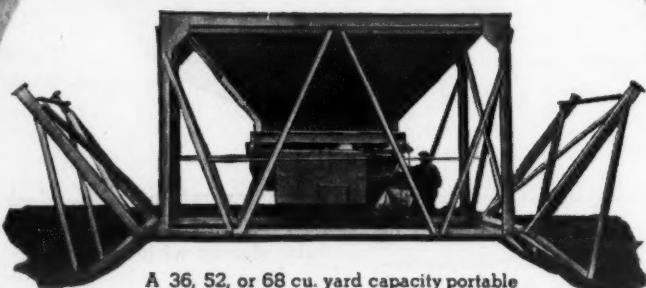
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Secondary Roads

(Continued from preceding page)

the average annual amount was \$307,000,000. In 1944 there was allocated 25.4 per cent of the total road-user revenue to this purpose.

Of course, there has been a falling off of the total road-user revenues during the war years. But it is apparent from their rapid growth since the removal of gas rationing that the total amounts will exceed the pre-war years very soon. In addition there is the Federal authorization of \$150,000,000 annually for each of the three fiscal years 1946-48. It must be conceded that, when compared with any previous period, the states and the Federal government are providing a very substantial contribution to the development of adequate secondary roads.

Every bit of this contribution will be needed, however. Let us assume that road-user-tax earnings are to be assigned to the road systems in the ratio of mileage use of the highways. Of the total rural traffic, 72.1 per cent is carried by the state primary systems. This leaves 27.9 per cent for the balance of the rural roads from which the Federal-Aid secondary-road systems are being selected. There is convincing evidence that the total highway traffic, particularly on our primary roads, will increase at a rate which is alarming, in view of our present inadequate facilities. Between 1921 and 1941, registered motor vehicles in operation increased three times, but in the same period the use of the individual vehicle doubled. Thus, in 1941 our highways were called upon to carry not the apparent three-fold increase over 20 years before, but six times the annual mileage of the earlier date.

Careful studies were made during a prior normal period of the effect upon farm values of improved roads. They led to this conclusion: that the provision of reliable year-round service to the farm gate increased the value of farm property. (However, the raising of road standards above this service did not, except in special cases, materially increase the value of the land.) This fact supports the reasonableness of maintaining an income from property taxes to be used with state and Federal allotments to advance the day of acceptable improvements upon rural roads.

There are serious problems to be met. For example, there is an exceedingly dangerous trend in the failure to collect road-user revenues which by every right should come to the public treasury. I refer to the refunds and exemptions of gas taxes. The following percentages are based on the total consumption of motor fuel within the states. In 1944, sixteen states, including the District of Columbia, refunded or exempted under 5 per cent of the total consumption of motor fuel for agricultural purposes; ten additional states exempted less than 10 per cent. Thus, 26 states found that fair exemptions for this purpose did not exceed 10 per cent of the total gallonage consumed during the year. Eight states refunded or exempted less than 15 per cent from taxation. Thus, 34 states found that under 15 per cent covered fair exemptions for the purpose—these included many of the dominantly agricultural states. Seven additional states exempted up to 20 per cent. Eight states either refunded or failed to collect taxes on 20 to above 60 per cent of the consumed gallonage. Of these, Kansas exempted above 40 per cent, and North Dakota above 60 per cent. Perhaps none of the states are more in need of, or more insistent upon, the development of farm roads than these latter two. Possibly gas rationing had an influence upon the lack of a fine or even a reasonable distinction between the road use and the agricultural

use, but the disastrous trend began long before rationing. Is this consideration not involved: fairness to the urban user who has long contributed the major portion of road-user income? At least a fair ratio should be maintained between insistence upon road improvement and the willingness to share the cost. This problem is basic.

It should have the best efforts of county, state, and Federal road officials.

In summary, under the uncertain post-war conditions, it can be fairly said that county, state, and Federal officials have made good progress in selecting and approving the first increments of the secondary-road systems; that the construction program has made

a fair start; and that on the whole a reassuring spirit of cooperation and mutual assistance exists among the responsible officials. As conditions affecting road construction become less uncertain, the way will be easier. I have faith in the future of this undertaking.

From an address before the Annual Meeting of the National Association of County Officials.

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U. S. E. D. Photo

Work starts at the site of Bluestone Dam on the New River in West Virginia. In the foreground, a Northwest 80-D 2 1/2-yard dragline loads an Athey wagon pulled by a Caterpillar D8. Another Northwest and a Dravo steam dragline are seen in the upper left.

Flood-Control Dam

(Continued from page 1)

142 feet long; the spillway section 790 feet long, flanked by training walls about 350 feet long and averaging about 35 feet wide at the base and 3 feet wide at the top; and a west abutment 317 feet long.

Principal approximate quantities are:

Concrete	1,000,000 cu. yds.
Reinforcing steel	4,300,000 lbs.
Structural steel	1,300,000 lbs.
Rock excavation	315,000 cu. yds.
Common excavation	100,000 cu. yds.

Initial Operations

Work on the Bluestone Dam is being accomplished in two cofferdams. The first coffer includes about 1,350 feet of the dam. The remaining approximate 710 feet of the structure will be accomplished in the second cofferdam area. First construction operations were on the non-overflow section.

Even before the first steel sheet cut-off wall was driven for construction of the first cofferdam, there was a small amount of clearing and stripping to be done. During February of 1942, the Dravo Corp. used a Northwest 95 2 1/2-yard dragline with a 90-foot boom, a Northwest 80-D 2 1/2-yard dragline with a 70-foot boom, as well as a Northwest 6 1 1/2-yard shovel in the preliminary stripping operations on the east bank. Hauling units were four Caterpillar D8 tractors with 11-yard Athey wagons.

As the stripping progressed, the contractor, using McKiernan-Terry 9-B-3 and Vulcan No. 2 steam-driven pile hammers, started driving a 300-foot straight cut-off wall of steel sheet piling on the upstream line of the area.

Excavation by dragline continued in the first cofferdam area with the three Northwests supplemented by a Dravo steam whirler used both for pile driving and excavation. Meanwhile the first cellular-type cofferdam had been driven at the edge of the steel cut-off wall and the Dravo steam whirler, with its pile hammer, started to move out into the river.

Cofferdams

Two types of cofferdams are being



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type cofferdam of steel sheet piling, driven around a wooden circular template, is being used on the upstream and river arms because the greater pool requires higher cofferdams than on the downstream arm. These cellular cofferdams vary in diameter from a minimum of 22 feet to a maximum of 42 feet and average 38 feet in height above the river bed. The second type of cofferdam used on the job is of the Ohio River type and is a bolted timber box coffer 22 feet wide and rising 14 feet above the river.

In the first area, about 1,500 feet of cellular-type cofferdamming was used, and 780 feet of box-type on the downstream arm. The second cofferdam area will include 1,000 feet of cellular-type cofferdams and 400 feet of box-type coffers. The cofferdams are filled with borrow from the area by a Northwest dragline.

Other Preparations

As construction went ahead in the first cofferdam area, the contractor was

busy with several other activities. At the job site, he built his concrete plant and aggregate bin set-up, laid tracks in the railroad yards and, below the dam, built a railroad bridge and laid an additional mile of access rails.

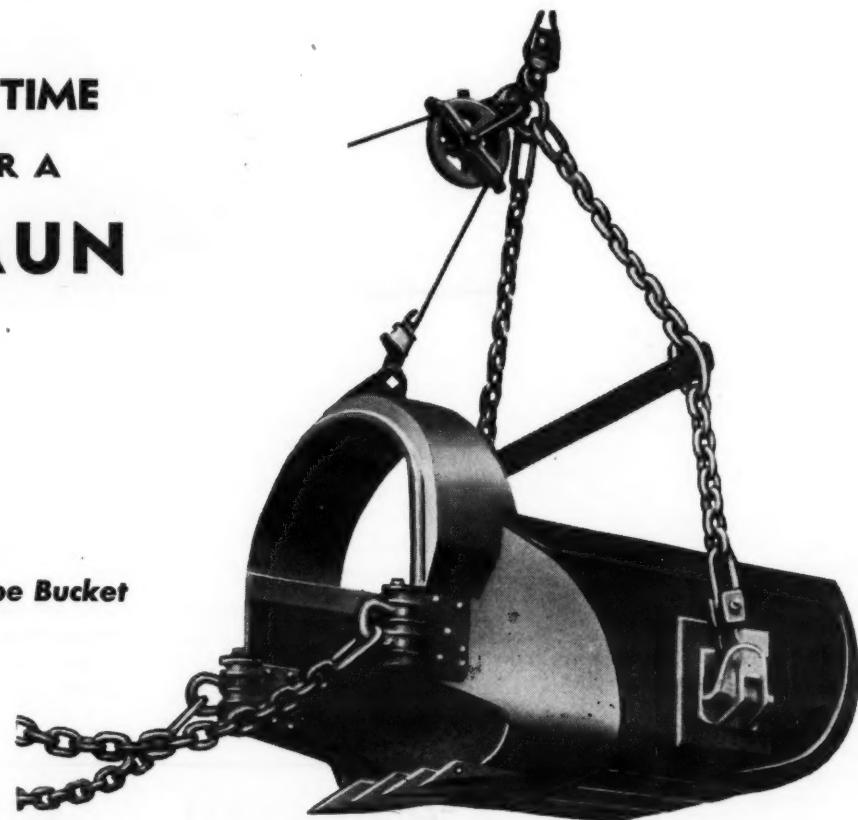
The Bluestone Dam is being constructed on the New River just above its confluence with the Greenbrier. Before materials could be brought to the site, it was necessary to bridge the Greenbrier with a timber-pile trestle 1,000 feet long for single tracks. An extension of about a mile of tracks was laid from the main line to the job site and another mile of tracks was laid at the job in the contractor's yard.

During the first months on the project, piles for the aggregate bins were driven by the Northwest 80-D. Inverted-V frames fabricated at the project carpenter shop were placed by the Northwest 95 with the 90-foot boom. Concrete piers were placed and the steel frame erected for the concrete plant.

(Continued on next page)

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Both Yaun's Shell-Type and Basket-Type buckets are available in light, medium and heavy-duty types in capacities from $\frac{3}{8}$ to 24 yards.



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Flood-Control Dam

(Continued from preceding page)

Before the end of 1942, everything was in readiness for pouring the first monolith.

Concrete Plant Set-Up

The Dravo Corp.'s set-up for handling aggregate and for mixing and placing concrete is geared to high production. Despite the numerous delays which make it impossible for placing to be a continuing process on a project such as this new dam, the concrete was running an average of about 1,200 cubic yards a day before work was halted during the war.

Upon resumption of work last spring, the Dravo Corp. placed from 270 cubic yards to 1,200 cubic yards a day. But as operations hit full stride again, this was expected to increase to a daily average of 2,500 cubic yards of concrete.

Four gradations of crushed limestone and two types of sand are being used in the mix. The aggregate is shipped to the job site by rail from a quarry 27 miles away. In the contractor's yard, aggregate is unloaded from hopper coal cars by gravity, then picked up and placed in bins by a Lambert electric whirler with a 3-yard clamshell.

The aggregate bins at the yard have a total length of 440 feet and are 40 feet wide at the top, sloping in a "V" to a conveyor belt at the bottom. There are six bins, one for each gradation of crushed limestone and type of sand. The aggregate sizes and level-measurement bin capacities for each are:

Aggregate	Bin Capacity
6-inch	2,940 tons
3-inch	2,620 tons
1½-inch	2,240 tons
¾-inch	1,865 tons
Natural sand	2,430 tons
Manufactured sand	880 tons

The manufactured sand is crushed limestone while the natural sand is river-run.

From the far end of the aggregate bins, a 36-inch belt conveyor runs for 700 feet to the batching bin at the mixing plant.

The batching bin has a capacity of:

Aggregate	Bin Capacity
6-inch	140 tons
3-inch	140 tons
1½-inch	140 tons
¾-inch	140 tons
Natural sand	135 tons
Manufactured sand	140 tons
Cement	802 bbls.

There is additional storage facility for 1,500 barrels of cement in a Blaw-Knox cement silo located just beyond the mixing plant. Cement is blown from cars in the railroad yard by unloaders located under the tracks through two 6-inch lines under 50-pound pressure direct to the mixing plant or to the storage silo.

The mixing plant was designed and built for the Dravo Corp. by the C. S. Johnson Co. The frame of the plant is of steel and concrete. At the top of the 5-story structure is the batching bin with its capacity of 835 tons of aggregate and 802 barrels of cement. Movement of aggregate from the aggregate bins on the ground to the batching bin over the conveyor belt is directed by telephone by a plant operator in the pilot house.

Aggregate, cement, and water in correct proportions are automatically weighed on Johnson scales and fed into a revolving hopper; this in turn feeds three 3-yard Koehring tilting mixers which occupy one floor of the mixing plant. The control room and panels are located just above the mixers; all of the operations are handled by push buttons.

Mixer operations are automatic and continuous, with the mixers discharging into a central hopper. At the ground level are 3-yard buckets on tram cars which are run by dinkies out onto the lower dam stage.

The mixing plant has a rate of 180 cubic yards an hour and is expected to maintain an average of 2,500 cubic yards per day on a three-shift schedule. Maximum operation of the plant would deliver 4,300 cubic yards of concrete every 24 hours.

Of the total of 1,000,000 cubic yards of concrete being placed in the Bluestone Dam, 22,000 cubic yards is Class A concrete, 120,000 cubic yards is Class B concrete, and 858,000 cubic yards is Class C concrete. Tons of aggregate being used in each class of concrete follow:

Aggregate	A	B	C	Total Tons
M'factured sand	5,742	17,640	128,700	152,082
Natural sand	8,327	51,060	373,659	433,046
¾-inch	9,372	28,440	208,065	245,877
1½-inch	14,047	34,380	251,823	300,250
3-inch	...	40,440	295,581	336,021
6-inch	...	46,380	339,339	385,719

1,852,995

Concrete Handling

Concrete in each cofferdam area is being placed in three stages by whirlers which pick up the 3-yard concrete buckets from the trams on the lower



U. S. E. D. Photo

Here stripping of the Bluestone Dam site is well along. In the foreground are the cellular-type cofferdams of steel sheet piling used on the upstream and river arms.

stages. The whirlers operate from tracks on platforms supported by two rows of concrete columns 8 feet in diameter. These concrete columns are erected in three stages, each of which

is 33 feet high. Steel column forms 8 x 33 feet are used, and the concrete is placed in the columns by crane. The sole function of these columns, which

(Continued on next page)

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Ask for Catalog JC-5.

THE JAEGER MACHINE COMPANY, Columbus 16, Ohio

REGIONAL OFFICES: 8 E. 48th St. 226 N. LaSalle St. 235-38 Martin Bldg.
NEW YORK 17, N. Y. CHICAGO 1, ILL. BIRMINGHAM 1, ALA.

Flood-Control Dam

(Continued from preceding page)

are later incorporated into the dam section, is to provide a foundation for the whirler platforms and tracks.

As work started in the first cofferdam area, 62 concrete piers were built in the first stage. As the first concrete was placed, a second stage of piers 33 feet high was placed for the whirlers. And finally a third stage of piers, again 33 feet high, was placed for the final concreting operations. The concrete piers are either 50 feet or 26 feet apart in the row, and the rows 17 feet apart center to center of the columns.

Seven Dravo whirlers are being used on the stages for the concrete work. The 3-yard concrete buckets are run onto the lower-stage elevation by three Vulcan diesel dinkies on 42-inch-gage track, and two Porter and one Vulcan gas dinky on 36-inch-gage track. There they are readily picked up by the whirlers and the concrete is placed in the forms.

Forms

Both Mahoning and Hiwassee cantilever-type forms are being used on the Bluestone Dam. The forms are placed first by whirler cranes and are raised as pouring continues by ratchet jacks. Forms remain on monoliths all the way up until the monoliths are topped out.

Upstream forms are on a regular slope and are carried right up to the top, but the downstream forms at some sections are on a different curve and must be changed occasionally. Forms are watered continually while the concrete is curing. Concrete forms for arches, beams, and slabs are left in place for 14 days; for columns, 7 days; and for walls and vertical faces, 2 days.

Steel and Iron

In addition to the steel listed earlier under "principal quantities", much other steel and iron is going into the dam in the form of gates, liners, and pipe. Pipe and pipe fittings for the dam will weigh about 674,000 pounds and electric conduit, from 1 to 4 inches in diameter, will weigh about 200,000 pounds. In addition to reinforcing steel and structural steel, another 515,000 pounds of miscellaneous steel will enter into construction of the project.

Among the firms who are supplying materials on the project are the following: for the sluice gates, Hardie Tynes Mfg. Co., Birmingham; for the sluice liners, Sheffield Foundry Co., Chicago, and Filer & Stowell, Milwaukee; reinforcing steel, Jones & Laughlin, Pittsburgh; and for the penstocks, Bethlehem Steel Co., Bethlehem. Contracts for furnishing the first 450,000 barrels of the 1,000,000 barrels of cement required to complete the 1,000,000 cubic yards of concrete were awarded to the Lehigh Portland Cement Co. The material is being supplied from its Fordwick, Va., plant.

Other Features

Although the Bluestone Dam is being erected as a flood-control project, provision is made for future power de-



U. S. E. D. Photo

Here Dravo 3-yard whirlers are engaged in placing the concrete in Bluestone Dam. The concreting plant and aggregate conveyor are seen in the background.

velopment should the need arise. The 330-foot intake section includes 6 penstocks 19 feet in diameter and the site of a possible future powerhouse.

Below the dam is a spillway apron with concrete baffles to dissipate the

energy of the discharge, and a stilling basin. The spillway apron is 62 feet long and 800 feet wide. The stilling basin, wire, and spillway apron comprise an area of about 350 feet by 800 feet.

Capacities

At elevation 1,520, the maximum allowable reservoir level, the total gross capacity of the Bluestone Dam will be 631,000 acre-feet. The net flood-control capacity above sluice inverts at elevation 1,389 will be 622,800 acre-feet. The net capacity between sluice inverts and spillway crest at elevation 1,490 will be 1.58 inches of run-off. The capacity between spillway crest and maximum allowable pool is 0.98 inch. The total net flood-control capacity above sluice inverts will be 2.56 inches of run-off from a drainage area of 4,565 square miles above the dam site. A reservoir will be created extending up the river as far as Narrows, Va., a distance of about 35 miles.

Personnel

As work on the project was resumed early last spring, the contractor was employing 300 men working two shifts, 6 days a week. After the second cofferdam has been built, the employment

(Concluded on next page)

This Piece of Rope is Doomed
(NEXT TIME THEY'LL USE IWRC)

IWRC
would have helped
prevent this

An independent wire rope center gives added support to the strands which lie around it.

Too bad. It was a good wire rope, and it could have lived a long, useful life. Instead, it's doomed to an early scrapping—and all because of crushing on the drum. The crushing was hastened by very poor spooling, which will shorten the life of any rope.

In some rope service, even with the best of spooling, it is difficult to avoid heavy, crushing pressures. But you can help counteract such pressures by purchasing rope with an IWRC (independent wire rope center). An independent wire rope center is a separate little rope in itself—a rope within a rope. It performs the same duty as the conventional hemp core, but is naturally stronger, less yielding under pressure.

With IWRC, you may sacrifice a minor amount of flexibility. Nevertheless, where the hazard of crushing is present, IWRC should be specified. Under these conditions, it will substantially prolong rope life.

Why not review your roping needs with a Bethlehem engineer? If he finds you need IWRC, he'll recommend it—but only where it will actually work to your advantage.

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Bethlehem, Pa.

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BETHLEHEM STEEL

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When you think WIRE ROPE . . . think BETHLEHEM



Flood-Control Dam

(Continued from preceding page)

will be increased and the contractor will work three shifts of 8 hours each per day.

The project is under the supervision of the Ohio River Division of the U. S. Army Corps of Engineers. Colonel Beverly C. Dunn is Division Engineer and R. G. West is Assistant Division Engineer. Immediate direction of the dam is under the U. S. Engineer Office at Huntington, W. Va., where Colonel F. W. Gano is District Engineer; Lt. Col. John R. Sharp is Executive Officer; and Harry Pockras is Technical Advisor. Chief of the Construction Division at Huntington is John J. Konrad.

Personnel of the U. S. Engineers at the dam site includes Robert B. Jenkins, Resident Engineer; A. C. Hooke, Assistant Resident Engineer; Homer Thrall, Engineer, Concrete Section; F. L. Minichan, Engineer, Field Engineering Section; and H. O. Webb, Jr., Office Engineer.

Key personnel for the Dravo Corp. includes O. A. Auhl, General Superintendent; R. A. Thompson, Construction Superintendent; Roy Switzer, Chief Engineer; and R. O. Wilson, Office Manager.

Hydraulic System Is Light in Weight

Described as a complete hydraulic system weighing only 5 pounds, the Powerpak has been put into production by Electrol, Inc. The unit is adaptable to use on road machinery and other installations.

Powerpak combines a complete hydraulic system in one unit, Electrol says. A hand pump, two separate 4-way selector valves, a relief valve, and a reservoir comprise the system. The unit can also be powered by a power-driven pump.

Using standard parts throughout, Powerpak stands 4½ inches high on a 3½ x 4-inch base. It is said to supply operating pressures up to 1,500 psi. The relief valve has settings up to 1,750 psi. Reservoir capacity can be increased beyond the normal 12 cubic inches. The unit can be attached in a confined space, since only the pump handle and valve levers need project into the open. Flow from the hand pump is ½ cubic inch per cycle, and up to 1½ gallons per minute from an engine pump.

Further details about the Powerpak can be obtained from Electrol Inc., 85 Grand St., Kingston, N. Y. Just mention this notice.

Joins Detrex Research

Following his discharge as a Lieutenant-Colonel from the U. S. Army Engineers, Dr. William L. McCracken has been named Administrative Assistant to C. F. Dinley, Sr., Vice President in charge of research and engineering for the Detrex Corp., Detroit, Mich.

Motor-Grader Literature

The improved Allis-Chalmers Model A-D motor grader is the subject of a new catalog issued by the firm's Tractor Division. The capacity, performance, and design of the A-D are stressed in the 32-page booklet. A 3-page illustration of the machine and specification sheets are included in the catalog, Form MS-300A. Copies can be obtained from the Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wis., on mention of CONTRACTORS AND ENGINEERS MONTHLY.

Describes Engine Controls

Controls for use on all types of internal-combustion engines are described in a 12-page booklet issued by Synchro-Start Products, 1046 W. Fullerton Ave., Chicago 14, Ill. The firm produces automatic and semi-automatic control units designed for economical engine performance and for engine protection. Copies of the booklet can be obtained by mentioning this notice. Drop a card to the above address.

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in Labor, Time and Money

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Free Please send me the free "Welders' Pocket Guide"—full of handy welding information, tables, charts, etc. Also send information on the items checked below:

Gasoline Drive Welder. Electric Drive Welder. "Build Your Own" Portable.

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You've got to be
GOOD
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● Like a college letter, the AGC rating plate isn't given to just anyone. Only the mixer or paver that has proved itself can wear it. In the words of the plate, the equipment must "guarantee to hold and properly mix a specified number of cubic feet of concrete plus 10% when operating on the level."

Equipment wearing the plate must live up to that guarantee. It is your assurance of quality and capacity . . . your assurance that you won't be guessing when you estimate jobs.

Before you buy, look for the AGC rating plate.



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The Kwik-Mix Company
Port Washington, Wis.

The Foote Co., Inc.
Nunda, N.Y.

The Jaeger Machine Co.
Columbus, Ohio

The T. L. Smith Company
Milwaukee, Wis.

The Knickerbocker Co.
Jackson, Mich.

An Automatic Tamper For Compaction Tests

A new easily operated tamper for preparing compacted soil specimens under the standard or modified Proctor tests, the California bearing ratio test, and others, has just been announced. A product of the Rainhart Co., this tamper has automatic features designed to assure uniform compaction processes, regardless of the operators or the intervals between the tests.

The device automatically spaces all blows in accordance with the pre-setting; releases a 5½ or 10-pound hammer for an accurate 12 or 18-inch free-falling drop, whichever has been selected; and automatically counts all blows. The specimen molds, in sizes up to 6 inches inside diameter x 10 inches, do not rotate and are solidly clamped down to assure accurately controlled compaction.

Stock hammers have 3.14-square-inch face areas, with either circular or circle-sector faces, and are convertible from 10 to 5½ pounds by an easily re-

moved section. Rubber-insulated feet and other features are provided for quiet operation. Taper-bored molds to simplify specimen removal are available.

For further information on this automatic tamper for soil-compaction tests, just write the Rainhart Co., 602 W. 34th St., Austin 21, Texas, and mention this item in CONTRACTORS AND ENGINEERS MONTHLY.

Truck Outlook Is Black

A further drop in the production of motor trucks may be expected, the Motor Truck Division of International Harvester Co. reports to the construction industry. The continuing acute shortage of sheet steel has upset almost all truck-production schedules. Having already held back production for some time, the steel shortage is becoming more grave than ever. Other vital truck materials are in short supply also, and heavy-duty transmissions, badly needed everywhere, are still hard to get.



PROTECTION ON THE JOB

Over and over, these tough, all-weather tarps pay for themselves because they stand up on job after job... preventing weather damage to materials, equipment and work in progress.

Fulton stands up because the rust-proof metal grommets are triple-reinforced—the strong, high-count canvas is permanently pressure impregnated with Fulton's exclusive weather and mildew treatment.

See your building supply dealer today for tough, weather-proof Fulton protection. A standard size for every use, a thousand uses for every size.

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NOW! P&H Hard-Facing Electrodes To Match Desired Rockwell "C" Hardness



P&H now makes hard surfacing a simpler, easier job—easier in the selection of the correct electrode... easier to get the desired as-welded hardness.

These four new P&H "Harcote" Electrodes do it! For now Harcote is available in a type having the exact degree of Rockwell C hardness for the job. If the job calls for a Rockwell C hardness of 55—just order and use Harcote "55". That's all there is to it! No guesswork—no confusion. Simply specify "Harcote" according to the corresponding number of Rockwell "C" hardness desired.

SAVE TIME — SAVE EQUIPMENT
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Call Your P&H Representative or write for complete information on Harcote. A complete line of other P&H electrodes is also available.

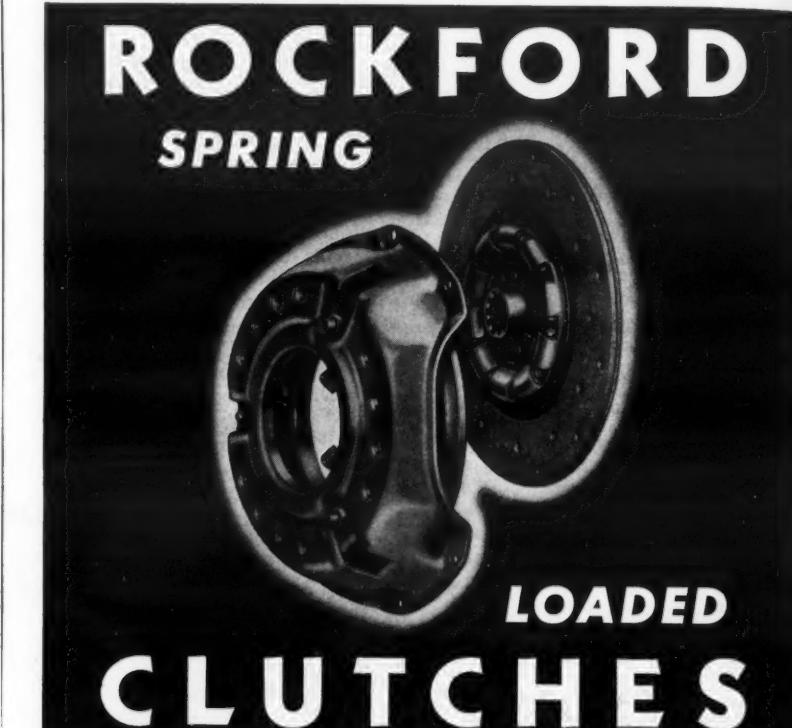
P & H

HARNISCHFEGER

General Offices:
4419 W. National
Avenue
Milwaukee 14, Wis.

Shovel-Crane-Dragline

Precision air control, as featured in the Lima Type 802 shovel-crane-dragline combination, is outlined in a new bulletin describing the 802. As a shovel the Type 802 has a 2-cubic-yard capacity; as a crane, 40 tons; and as a dragline, variable. Special high-lift equipment can be furnished. Specifications, capacities, and working ranges of the 802 are included in the 20 pages, as well as photographs detailing its construction. Copies of Bulletin 82-A can be obtained by writing the Lima Locomotive Works, Shovel & Crane Division, Lima, Ohio, and mentioning CONTRACTORS AND ENGINEERS MONTHLY.



LIGHT PEDAL PRESSURE

CUSHIONED ENGAGEMENT

VIBRATION DAMPENING

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DIRT EXCLUSION

HEAT DISSIPATION

LIFETIME ADJUSTMENT

* Over a quarter century of experience designing many types of clutches, for use in a wide variety of industries, has proved to ROCKFORD engineers the importance of liberating the heat that is generated within friction type clutches. For this reason, ROCKFORD CLUTCHES cover designs provide for ample ventilation. Other parts that help dissipate heat are designed accordingly.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



ROCKFORD CLUTCH DIVISION

314 Catherine Street, Rockford, Illinois, U.S.A.

BORG-WARNER

NOTICE

TO CONTRACTORS

Before the end of 1946, the Sewerage and Water Board of New Orleans, Louisiana, expects to call for bids for the construction of a water main consisting of the following:

- 14,350 lineal feet of 48-inch cast iron pipe, or of steel pipe of the same outside diameter.
- 9,400 lineal feet of 42-inch cast iron pipe, or of steel pipe of the same outside diameter.
- 11,650 lineal feet of 36-inch cast iron pipe, or of steel pipe of the same outside diameter.
- 6,100 lineal feet of 30-inch cast iron pipe, or of steel pipe of the same outside diameter.
- 4,650 lineal feet of 24-inch cast iron pipe.

Installation of the whole main, including the furnishing of the 24-inch cast iron pipe, will be under one contract. Cast iron pipe and/or steel pipe of 30-inch size and larger, and valves—both gate and check—will be purchased under separate contracts. . . . The installation of the water main will be in city streets, from the purification plant to the other side of the city; and, is to be completed within twelve months after the delivery of the pipe.

BIDDERS MUST BE LICENSED UNDER LOUISIANA LAW

Since bidders on the installing contract are required to be licensed under Louisiana Law before they can be issued plans and specifications for making proposals, all contractors who may be interested in bidding on the above work are invited to communicate with the General Superintendent, Sewerage and Water Board of New Orleans, 526 Carondelet St., New Orleans 12, La., who will furnish full information as to the work to be done and the qualifications required of contractors.



Mrs. Lou Hoke, who directs the activities of the Hoke Construction Co. of San Antonio, takes a turn at one of her Allis-Chalmers tractors.

Skinner Beware! Fair Sex Takes Over Tractors

"Never underestimate the power of woman" is an adage that's getting big play down in Texas. And the woman in this instance is a beauty-parlor operator who has taken to driving tractors! Ninety-pound Mrs. Lou Hoke directs the activities of the Hoke Construction Co., San Antonio, having forsaken beauty parlors in 1939. An ex-schoolteacher and telephone operator, Mrs. Hoke thinks nothing of taking over

the controls of one of the big Allis-Chalmers tractors which the firm uses in building reservoirs and lakes.

Mrs. Hoke's company works with the Soil Conservation Agency; she has to keep thoroughly acquainted with the conservation program if she is to sell her services to the Texas farmers. Many a rancher has gotten a big surprise from this little lady whose nail polish and curled hair belie her man-sized job.

Proper Lubrication Pays Dividends to Contractors

The dependable performance of his equipment means additional revenues for the modern contractor. Much of this dependability must come from the proper lubrication of his machinery, the Stewart-Warner Corp. points out in a recently issued booklet.

Correct lubrication demands a well rounded program featuring not only the proper selection of oils and greases for specific tasks, but also the right kind of handling and application.

Modern lubrication procedures developed by the firm's Alemite Division are outlined for the construction industry in the 12-page booklet. Included is a chart giving the recommended Alemite oil or grease for specific parts of

construction machinery in winter and summer. The characteristics of the various Alemite products are listed, and advice is given on their application. The elimination of waste and contamination is stressed.

Proper lubrication will mean money in your pocket. Write the Alemite Division of the Stewart-Warner Corp., 1826 Diversey Parkway, Chicago 14, Ill., for copies of Form 22-135.

Winches and Hoists

Some of its hoists and winches, and their specifications, are briefly outlined by the Sasgen Derrick Co. in a leaflet, Form MS-61. The firm makes these units in a wide range of capacities for many uses. To secure your copy of this leaflet, or a complete catalog, write to Sasgen at 3101-27 W. Grand Ave., Chicago 22, Ill., and mention this notice.

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WHEN YOU WANT IT
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There's an economical "U.S." unit for every construction-work need. Engineered by men with practical, out-in-the-field experience. Built to take every punishment — and operate faithfully for long continuous hours. Sizes from 500 watts to 15 KW. Skids, rings, porter bars, and trailer mountings available.

"U.S." BUILDS A COMPLETE LINE of Gasoline and Diesel Electric Plants up to 75 KW—for standby, continuous duty, battery-charging, and portable uses. Write for literature, stating type of unit and capacity required.

UNITED STATES MOTORS CORP.
554 Nebraska Street Oshkosh, Wisconsin
Factory representatives strategically located throughout U.S.A. and Canada.

"U.S." ELECTRIC PLANTS



Sterling barrows wheel so easily, they make it seem like going down hill all the way. Lightweight...well-balanced...equipped with modern, anti-friction bearings. Sterlings relieve the operator of fully 80% of the load. That's why they are the preferred barrow in all types of industries.

The demand for Sterlings continues to exceed the supply. Deliveries, however, will be stepped up as rapidly as conditions permit.

**Well
Balanced
FOR
EASY WHEELING!**



Look for this Mark of
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STERLING WHEELBARROW CO., Milwaukee 14, Wis.

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WHEELBARROWS

**ADD THOUSANDS OF DOLLARS
TO YOUR ANNUAL PROFITS
by POURING CONCRETE with
CON-VAY-IT 12-20 SPECIAL**



Profit-wise contractors are equipping themselves with this new, improved concrete conveyor; because with CON-VAY-IT they can place 3 to 4 times more concrete than by the wheelbarrow method, in the same period of time. This enables them to handle more contracts and to turn them out faster—which all adds up to...MORE PROFITS.

Write TODAY for details—use this coupon.

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I am interested in your CON-VAY-IT 12-20 CONCRETE SPECIAL. Please send me full information on this machine.

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First to feature Welded Steel Construction
WELLMAN
Williams Type BUCKETS



Bucket users know that welded steel construction means longer service at lower cost. Wellman originated this finer type of bucket construction! A type for every service: Multiple Rope, Power Arm, Dragline, Power Wheel. Special Service: $\frac{3}{4}$ to $16\frac{1}{2}$ yd. capacity.

SEND FOR BULLETIN

THE WELLMAN ENGINEERING COMPANY
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Used Construction Equipment Available for Immediate Delivery

1—Buffalo Springfield 7-Ton tandem road roller, Serial No. 3280.

SLIGHTLY USED

1—Atkins WX32 32-in. Chain Saw complete with gasoline engine driven generator, 200-ft. cable. Extra cutting chain. All complete.

PERFECT CONDITION

1—Gorman Rupp Model R80—Triplex road pump 80 G.P.M. @ 500 Lbs. Pressure, 4-in. Suction, 3-in. Discharge, complete with 4-cyl. Le Roi gasoline engine, all mounted on 4-Wheel truck—Rebuilt and guaranteed perfect-condition.

1—Gar Wood Model RB-X attachment for converting bulldozer into trailbuilder on Allis Chalmers Model HD7W Tractor.

IN WORKING CONDITION

1—MultiFoote 27E Paver. 18-ft. boom gasoline powered.

LAKESHORE MACHINERY & SUPPLY CO.

400 West Laketon Avenue
Muskegon, Michigan. Phone 2-655

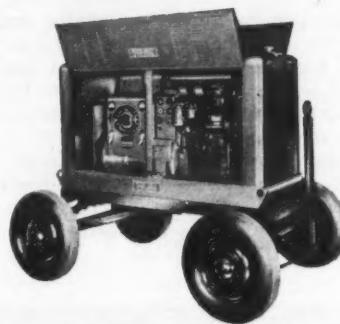
Diesel-Drive Welder Has Remote Controls

A diesel-powered arc welder is the newest addition to the Hobart line of Multi-Range welders. The unit has a 300-ampere capacity, and is powered by a 2-cylinder unit-injection diesel engine that is rated at 47 hp.

Dual control and remote control enable the operator to make fine adjustments in the voltage and amperage right at the work, Hobart says. Arc intensity can be selected from 1,000 combinations of voltage and amperage. The current range for welding duty is from 20 to 40 volts, 60 to 375 amperes.

Engine controls for the new model are located alongside the generator control cabinet. The engine has push-button starting, and is controlled by a governor and idling device. The entire unit is enclosed in a steel canopy with hinged side panels that can be locked.

Complete specifications for this new member of the Multi-Range group can be secured from the Hobart Brothers



The newest addition to the line of Hobart Multi-Range arc welders is this 300-ampere diesel-engine-driven unit.

Co., Box CE-96, Troy, Ohio, on mention of this news item.

Steel-Form Rental Plan

Steel forms for concrete construction speed up the work and increase the profits, Economy Forms Corp. says in a brochure on its engineering and form-rental service. Standard types of forms

are available for most types of concrete structures.

Copies of the brochure and details about the service can be obtained from the firm at 4301 No. E. 14th St., Des Moines, Iowa. Mention CONTRACTORS AND ENGINEERS MONTHLY.

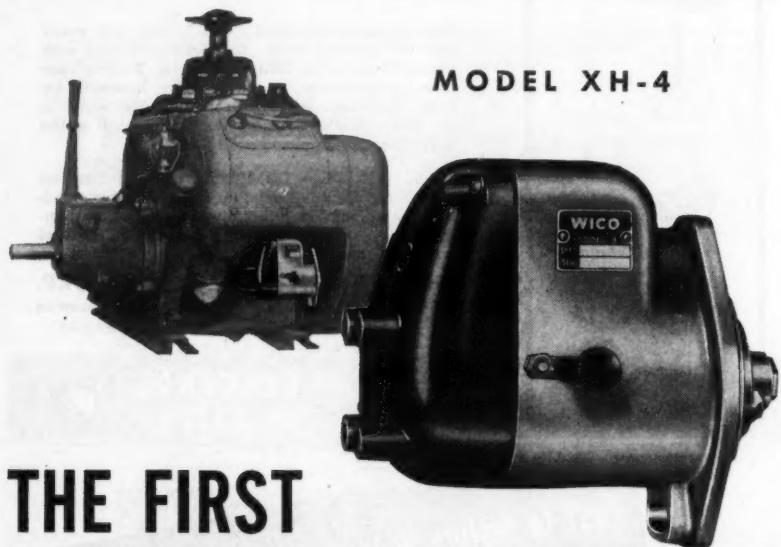
Small Gasoline Engines

Wisconsin heavy-duty air-cooled gasoline engines in the 1 to 5-hp range are described in a recently revised bulletin. The catalog gives full specifications, diagrams, and power ratings for five models. The units can be supplied with or without reduction and clutch assemblies.

Copies of the descriptive bulletin, SAA 46-3, can be secured on mention of this report. Write the Wisconsin Motor Corp., 1910 So. 53rd St., Milwaukee 14, Wis.

Hyster Div. Sales Mgr.

Ray Ronald has been appointed Western Division Sales Manager of the Hyster Co., Portland, Oreg. Experienced in the engineering, construction, and materials-handling fields, Mr. Ronald will have charge of western sales for both the tractor equipment and industrial lift-truck divisions of the company.



MODEL XH-4

THE FIRST POST-WAR WICO MAGNETO

[FEWER PARTS - MORE COMPACT]

More compact and incorporating fewer parts, the Model XH-4 replaces the type J WICO Magneto which has been popular for so many years. It is an SAE, flange mounted unit generating four powerful sparks with each revolution of the magneto rotor shaft. Outstanding new features which assure longer service are:

BEARINGS—Shielded sealed ball bearing in the drive end of the magneto and a large pre-lubricated porous bronze bearing in the distributor end.

MAGNETIC ROTOR AND CAM—Large, ring-shaped magnet of Alnico steel to which the laminated pole shoes are assembled and die-cast in aluminum to the rotor shaft. Cam is an integral part of the shaft, hardened and highly polished. This design provides a one-piece sturdy magnetic rotor unit.

COIL—Heavy duty type, surge wound with larger diameter wire and heavier insulation used in outside secondary layers where the greatest electrical strain exists.

DISTRIBUTOR—Jump spark type of plastic of high electrical strength. Distributor arm mounted directly on the magnetic rotor shaft and incorporating the distributor carbon. Extra large leakage distance in the distributor reduces possibility of spark jump-over.

Originally designed for Wisconsin Motor Corporation "V" series engines, they serve as original or replacement equipment wherever the Model J WICO is used. Ask your nearby WICO distributor for a completely descriptive Bulletin. Wico Electric Company, West Springfield, Massachusetts.



THE NEW JACKSON FS-7A EXACTLY THE VIBRATOR YOU'VE LONG wanted!

★ LIGHTER FOR EASIER HANDLING

The JACKSON FS-7A Flexible Shaft Concrete Vibrator is built around an amazing new type motor that weighs just 28 lbs., yet develops far more power per pound of weight than any other motor we have previously used in equipment of this type. Operates on AC or DC, 115 Volt power and may be plugged into light socket or power plant.

★ IDEAL FOR THOSE HARD-TO-GET-AT PLACES — thin walls, heavily reinforced sections and around structural steel. And in addition it is

★ HUSKY ENOUGH TO HANDLE THE LARGER HEADS AND LONGER SHAFTS

The FS-7A will handle any of our standard heads up to 2 3/8" x 18 1/2", and may be equipped with flexible shafting of 24", 36", 7', or 14 ft. lengths. Motor produces 7,000 to 10,000 V.P.M. depending on the length of shaft, size of head and consistency of concrete.

★ A GENERAL PURPOSE VIBRATOR

that steps up production and saves the cost of extra equipment by its wide range of application. See your JACKSON distributor or write for further details.

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON MICHIGAN

Heads Clay-Pipe Group

Eugene K. Sheffield, President and General Manager of The Logan Clay Products Co., Logan, Ohio, and of the Straitsville Brick Co., Straitsville, Ohio, has been named President of the National Clay Pipe Manufacturers, Inc.

He succeeds Edward F. Clemens, Vice President of the Cannelton Sewer Pipe Co., Cannelton, Ind., who has resigned. Fred S. Cresswell, who served other clay-pipe organizations before entering the Navy, has been named Manager of the National Clay Pipe Manufacturers, Inc., with offices in Washington, D. C.

To Save TIME and TIRES

GATKE BRAKE BLOCKS



Custom-Bilt
for Trucks, Tractors,
Trailers, Buses, Cars
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Equipment

Smooth, non-grabbing action that adds countless miles to tire life and reduces strain on driver and equipment.

Balanced holding power for positive stopping under all conditions.

No let down in efficiency on long grades.

Long wear life with fewer adjustments to keep vehicles on the road, maintaining schedules with SAFETY.

These are a few of the many Extra Values GATKE CUSTOM-BILT Brake Blocks give you. They are saving time and money for fleet operators, LARGE and small, all over America.

RESULTS TALK: Use GATKE Brake Blocks for your next five relines and compare performance with the best you ever had.

Ask your GATKE Jobber or write.

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BLOCKS SETS ROLLS SHEETS
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Elliott's LIN-O-BLU Paper

NONE LIKE IT . . . FOR DIRECT BLUE LINE PRINTS
★ No. 6 50% Rag Stock Papers

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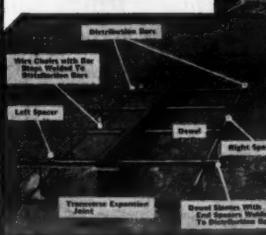
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On the two jobs during April and May, the 2 Tournapulls moved a total of 80,000 yards — working 50 eight-hour days. Later, third Tournapull was added and race track was completed in less than 3 months despite heavy spring rains. All 3 Tournapulls are now working full time at the quarry.

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